MACROECONOMICS AND POLITICAL INSTITUTIONS IN WESTERN EUROPEAN MULTI-PARTY DEMOCRACIES

thesis submitted by

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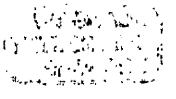
Abstract

In this thesis, I study three aspects of the interaction between politics and economics in coalition systems. First, theoretical and empirical issues concerning the political bargaining process over cabinet formation are addressed. Theoretical predictions on the duration of the process and its outcome are tested for the period 1950-1995. It turns out that the formation delay is increasing in the degree of ideological heterogeneity of coalition partners and that the share of portfolios secured by the formateur is decreasing in the degree of complexity of the bargaining environment. A few factors affecting the degree to which the outcome of the negotiation process can be defined as balanced are also identified.

Second, I investigate the politics and economics of cabinet survival. A Proportional Hazards Specification for cabinet duration data is estimated by mean of a flexible parametric approach. I find that the hazard rate is determined by the majority status, the degree of fragmentation and ideological homogeneity of the coalition, the polarisation of the legislature and the time horizon at the moment the cabinet is formed. Interesting innovative results concern the greater stability of cabinets supported by coalitions ideologically closer to the median party and/or left-oriented. The overall state of the economy also appears to play a role. Graphical evidence suggests that the underlying distribution of duration data might be a Gompertz or a Weibull distribution, but not certainly an exponential distribution, as instead it is often assumed in the literature.

Third, I look at the political and institutional determinants of fiscal policy outcomes (deficit, spending and taxation). Panel estimates show that the ideological orientation of the policymaker, the degree of cabinet instability, cross-country differences in electoral and budgetary institutions and the dispersion of political power within the ruling coalition all significantly affect fiscal policy variables. Instead, the preferences of the median voter appear to have relatively little importance. The evidence also rejects the hypothesis of systematic pre-electoral manipulation of fiscal instruments.

A full description of the data-set of political indicators I have constructed and used to estimate the models in this thesis is also given. Specific attention is devoted to some methodological instances concerning the theoretical underpinning of empirical proxies. As an overview of the contents of the data-set, I discuss the evolution of basic attributes of legislatures and governments in the thirteen countries that constitute the sample for my analysis.



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Friends and relatives outside the academia were also important for the success of the enterprise. Although physically separated from me by a Channel and some continental land, my parents Pietro and Nunzia and my sister Stefania always supported me with their love. My father paid for my education for about eighteen years and I hope that what I have written in the pages that follow is a signal that he did not waste his money. Finally, how could I have gone through all this without my wife Deanna ?

Milano, May 2001.

To my family

> *"If rulers are fair and human and they share prosperity and difficulties with the people, then soldiers will be loyal and support the priorities of the government"* (Jia Ling, Tang dinasty, comment to Sun Tzu, *The Art of the War*, edited by Thomas Cleary, Shambhala Publications 1988; Italian edition by Giampaolo Fiorentini, Ubaldini Editore-Roma, 1990).

Political economy, broadly defined as the analysis of the design of institutions and of the interactions between politics and economics, is currently a most active field of research in the literature. Personally, I find this hardly surprising. Economic decisions are not made in a political *vacuum*. On the contrary, the political process and the institutional framework significantly contribute to determining the incentives and the behaviour of policymakers. At the same time, the course of politics is most likely to be affected by economic events. Once economists and political scientists have recognised this *joint endogeneity* of economics and politics, a strong interest in the investigation of issues at the border between the two disciplines has naturally arisen.

Even if early contributions in political economy can be possibly dated back to Von Neumann and Morgenstern (1944), it is with the seminal work by Nordhaus (1975) on the political business cycle that research in this area has entered its "golden age". Since then, scholars have considerably enlarged their field of observation. A very incomplete list of issues tackled by political economists would include: the impact of the political structure on negotiations over economic policy formation (budget, public spending and provision of public goods, choice of a point on the inflation/unemployment trade-off), the links between political conditions and speed (and success) of economic reforms, the role of economic conditions in political bargaining (negotiations over government formation and duration), the economics of the electoral process (definition of policy platforms, endogeneity of elections date and outcomes) and the politics of economic growth[1]. Research has proceeded along both theoretical and empirical lines. Theoretical

[1] Excellent systematic treatments of the various aspects of the political economy literature are provided by Drazen (2000) and Persson and Tabellini (2000).

models have been constructed to formalise the channels through which the interaction of economic and political phenomena is most likely to take place. Econometric analysis has been undertaken to verify the empirical relevance of the predictions generated by the theoretical models as well as to identify some stylised facts that could be used as guidelines in the development of new (and more realistic) theories.

Mine is a thesis on political economy issues. However, given this vast field of observation, I had to restrict its focus by making three fundamental choices. The first one pertains to the problems addressed. The second one to degree of theoretical vs. econometric orientation of the work. The third one to the type of economies to be studied (e.g. industrial or developing countries). I will now go into the details of these three choices and try to explain the objectives of the enterprise and what the reader can expect to find in the Chapters to follow.

Issues addressed: cabinet formation, government duration and fiscal policy-making.

Most industrial and developing countries are nowadays characterised as representative democracies. This means that policy decisions are delegated by citizens to elected representatives that seat in the parliament and/or in the government. More precisely, political scientists note that, at least in the case of parliamentary democracies (that, as I will explain later, are the type of countries I focus on), the cabinet is responsible for the actual implementation of real policy decisions, whilst the parliament retains the power to make and break the executive. It then follows that policy outputs are heavily influenced by the way in which decision-making power is allocated to different actors (or parties) in the cabinet. Therefore, a good understanding of economic policy formation (what policy choices are taken and in which circumstances) does require a good understanding of how bargaining over the allocation of decision-making power evolves. This allocation of decision-making power is determined at the time of cabinet formation; that is, when portfolios are assigned to specific ministers (or parties) and policy proposals to be implemented during office defined. The conclusion is thus that the analysis of cabinet formation is of interest to both economists and political scientists.

Once the cabinet is formed, it will not necessarily stay in office until the expiration of the constitutionally established parliamentary term. On the contrary, in most countries, early cabinet terminations are observed. If it is true that alternation in office is a key feature of democratic systems, it is also true that an excessively fast turnover can

have distortionary effects. For instance, continuously facing a positive probability to collapse, the incumbent government could have an incentive to undertake myopic (opportunistic) policies aimed at granting political survival in the short run, but sub-optimal in terms of long-run efficiency. Similarly, frequent government transfers might generate uncertainty about the future course of economic policy, thus preventing agents to invest in profitable activities and so reducing growth prospects in the long run. It is therefore important to investigate what determines government duration. In particular, it can be of great interest to see whether the survival of a cabinet is somehow endogenous to economic conditions; that is, if governments with a particularly poor economic performance are not just punished by voters at the next elections, but also risk to be terminated before the completion of their constitutional mandate.

A possible context where the impact of politics on economic policy formation is most clearly observed is fiscal policy-making. Standard economic theories of taxation and spending predicts that the budget should be used as a buffer over the business cycle. Overall, deficits should arise during recessions and be compensated (at least in present value terms) by the surpluses realised during expansions. However, the observed persistency of deficits cannot be explained by such theories. A possibility is that the determination of fiscal policy is not based only on purely economic considerations, but that political factors enter the picture by affecting spending and taxation decisions. The analysis of the political economy of budget deficits is thus an issue of interest, especially given that, in spite of the already vast literature produced so far, several questions still remain open.

All in all, I direct my research efforts to the analysis of these three issues: how the cabinet is formed, what determines its duration and how politics affects fiscal policy outputs. Thus, many other issues in political economy are not addressed. In particular, I do not tackle here a topic which is becoming increasingly popular in the literature: the politics of economic growth. But I leave it for another time.

Theoretical versus econometric focus of the research

The focus of the research is on the econometrics, in the sense that I believe that most of its value added is represented by innovative empirical results. As a matter of fact, I construct a new data-set of political measures that allows me to shed additional light on debated issues as well as to study issues that have not been considered in the

applied literature before[2]. However, this does not mean absence of theoretical analysis. For each of the three subjects under investigation, the theoretical literature is discussed (and formally presented in the core of the Chapters and in mathematical appendices) in order to identify theory-based testable predictions and to elaborate *ex-ante* expectations concerning the sign of the estimated coefficients of parameters in the econometric models. Both the econometric specification and the design of the empirical political proxies thus have a solid theoretical underpinning, which makes results more easily interpretable. Furthermore, for the specific case of bargaining over cabinet formation, an original extensive-form is proposed. This is based on the game of *war of attrition*, and, unlike existing applications of the same approach, it involves a peculiar form of uncertainty on the nature of players.

A sample of coalition systems

A large proportion of theoretical contributions in political economy assume a two-party system with simple majority voting. This implies that one of the two parties will control the absolute majority of seats in the parliament and henceforth that it will form a single-party majority government. Political scientists refer such countries as to *single party majority systems.* A typical example is represented by the United Kingdom, where electoral competition is effectively limited to two major parties (albeit other seven parties currently hold at least one seat in the House of Commons) and 19 out of the 20 post-war cabinets were single-party majority governments. Canada and New Zealand can also be characterised as single-party majority systems. The United States, with reference to which most theoretical models have been originally constructed, are instead a less clear-cut case. Indeed, competition for office is limited to two parties[3], but the control of the Congress and of the Administration is often divided between Republicans and Democrats. This form of divided government has occurred a number of times during the post-war period (10 out of 14 Administrations faced, for at least two years during their office, a Congress where the majority of seats was controlled by the other party) and it involves problems of political bargaining which are quite similar to those commonly encountered in parliamentary democracies with coalition governments.

[2] The whole data-set will be soon made available on the WWW. In the meantime, the data required to replicate the results in this thesis are available in WKS format from the author upon request.

[3] Although the presence of a third smaller party has sometimes had a strong impact on the electoral outcome (e.g. Ross Perot's Reform Party in 1992 and the Green Movement in 2000).

The standard two-party model of the political process is not fully appropriate to represent the case of countries where legislature are fragmented into a relatively large number of parties and a single party that controls an absolute majority of parliamentary seats does not exist. Countries with such characteristics are called *coalition systems.* The typical case is the group of western European (continental) democracies, where governments are normally supported by coalitions of two or more parties. Political scientists (e.g. Laver and Shepsle, 1994) consider as coalition systems also countries such as Norway and Sweden where most governments are single-party minority cabinets. Minority governments need to obtain external support from other parties in order to survive legislative challenges and have their proposals accepted by the parliament. In this sense, they must engage in a legislative bargaining similar to the bargaining that normally characterises political life in countries with coalition governments.

A quick look at the composition of cabinets and parliaments in modern democracies shows that coalition systems tend to be the norm. Of the 29 OECD countries, at October 1999, 17 are governed by coalitions. Out of the remaining 12 countries, only three have a single-party majority government and one (the USA) has a divided government. Furthermore, only in USA, UK, Japan, New Zealand, Canada and Australia, the effective number of parties in the legislature is sufficiently close to two. An even more fragmented pattern is observed in the group of newly formed eastern European democracies. Only in Croatia and Albania the majority of seats in the parliament is controlled by a single party and only in Croatia this single party forms the government (in Albania government is formed by a coalition of three parties). The other case of single party government is observed in Yugoslavia (still under the Milosevic regime), but this is formally a minority government.

In the end, most modern democracies are coalition systems. I therefore decided to focus on this specific type of countries. The econometric analysis will be carried out on a sample of thirteen western European coalition systems: Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway and Sweden. It is worth pointing out that it is common in the political science literature to consider Finland and France as semi-presidential countries (see Woldendorp et al. 1998) which are quite distinct from the textbook case of a truly presidential democracy (the USA). In general, other than the characterisation as coalition systems, all countries in my sample share common features for what concerns the social context of government formation, institutional procedures of government

disruption and structure of the decision making process within both the cabinet and the parliament. This means that they constitute a sufficiently homogeneous sample.

The sample period of all empirical analysis will be normally set to the period 1950-1995, although in the case of the analysis of political bias in fiscal policy formation it is restricted to 1960-1995 as a consequence of the lack of sufficiently long time-series of economic indicators. Additional details will be provided in the Chapters to follow.

Plan of campaign.

The thesis is organised in four Chapters. Chapter 1 gives an overview of the data-set (composition, classification of variables, summary statistics and sources of raw data), and discusses some preliminary evidence concerning the structure of the political framework in the thirteen western European coalition systems that constitute my universe of observation. A methodological issue is also brought to attention. The qualitative nature of political factors makes their empirical representation and measurement problematic. To avoid model uncertainty and difficulties in the interpretation of econometric results, the design of empirical political indicators must therefore rely on a solid theoretical underpinning. This means that an effort has to be made to link explicitly econometrics to theories.

Chapter 2 is devoted to the analysis of the process of cabinet formation. The Chapter is introduced by a quotation from an Italian movie that clarifies the ultimate object of analysis: how do parties decide who controls what ? Three different forms of bargaining game are discussed. In the first one, parties negotiate over the control of a small set of key portfolios. Obtaining control of such portfolios is the necessary condition for the party to be able to influence the process of policy formation. The model is formalised as a war of attrition. Its innovative aspect lays in the fact that throughout the negotiations, parties are uncertain about their own prize valuation; that is, using a more game-theoretic language, parties do not know their own nature. The second form of bargaining is a classical problem of allocation of a cake. The cake is represented by the set of cabinet posts and parties negotiate to obtain the largest possible share. The third form is set in the tradition of the legislative bargaining theory: parties negotiate over policy outcomes directly. In this framework a cabinet is formed when coalition partners achieve an agreement over a specific policy proposal to be implemented. The structure is one of a spatial model of voting and an interesting prediction concerning the degree of balance of the outcome of negotiations is generated.

The empirical analysis focuses on the test of predictions obtained from each of the three models. A semi-parametric statistical model is estimated to study the determinants of the duration of the negotiation process. Results are consistent with predictions from the model where the object of bargaining is a small set of key portfolios. A logistic regression is instead used to test the key prediction of the model of bargaining over the allocation of the cake. Empirical evidence is not fully supportive of the theory, but the analysis identifies a few important determinants of the share (of the cake) secured by the *formateur party*. Finally, I use the Box-Cox regression model to test the implication of legislative bargaining theory and I obtain somehow mixed results: its central prediction is supported by the empirical evidence, but only for some of the specifications of the econometric model. Evidence is also produced on how economic conditions affect the various aspects of the bargaining process.

In Chapter 3 the analysis of what determines cabinet stability is undertaken. First a theoretical model of stability of political agreements is discussed. Government is regarded as the equilibrium outcome of a bargaining process. Then, the stability of this equilibrium in the presence of stochastic shocks determines the survival of the government. Factors that enhance (or reduce) stability are thus identified as potential determinants of government duration. The objective of the econometric analysis is to see whether such factors effectively have a systematic impact on observed cabinet survival. The statistical framework is a flexible parametric approach that allows me to obtain estimates of the baseline integrated hazard function. These estimates are then used to evaluate the degree of time dependence of the stochastic process that represents the life of a cabinet. A broad set of interesting results are obtained. In particular, it appears that positive economic conditions effectively increase cabinet survival. In addition to that, a clear link between the ideological orientation of the incumbent and its chances to remain in office is found. The mechanism underlying this link is most likely to operate through economic factors. Details of why this could be the case are given in the Appendix to the Chapter by mean of a game theoretic representation of the interaction between government and unions.

In Chapter 4 I look at the political determinants of fiscal policy decisions. Five specific sources of "political bias" are considered: (i) electoral manipulation of fiscal policy and fiscal illusion, (ii) ideological orientation of the policymaker, (iii) political instability, (iv) fragmentation and dispersion of political power, (v) budgetary rules and electoral institutions. Again, the first part of the Chapter is devoted to the analysis of theoretical models. The second part contains the econometric analysis, based on the

estimation of a panel of about 450 annual observations. I choose a model specification which is in line with almost all the literature in this area, so to make my results comparable to those already obtained by other scholars. Among else, I find that the minority status of the government is not necessarily a disadvantage. What really makes governments more fiscally irresponsible is the coalitional status. This result is partially compensated by the finding that in more polarised legislatures, minority governments effectively find it more problematic to balance the budget. I also estimate the impact on policy outputs of the ideological preferences of the median voter. It turns out that when conflicting with the ideological orientation of the incumbent government (and this happens quite a few times), the ideology of the median voter does not matter.

The key findings of the four chapters are summarised in the Conclusions, where I also try to set some lines of future research. At this point, I believe that it is time for some explanatory notes that will be useful throughout the rest of the thesis. I will use the terms government and cabinet as equivalent to indicate the executive. The executive is responsible for the actual implementation of real policy decisions and needs the support of a legislative majority to have its bills passed. The parties that participate into government form the ruling coalition. However, parties giving only external support and not assuming any office responsibility are not considered as members of the ruling coalition. Before that an agreement over government composition is reached, the parties engaged in bargaining form a proto-coalition. That is, the proto-coalition is the ruling coalition before that the cabinet formally enters office. In some cases, I will refer to a specific government using the name of the prime minister. So, for instance, Andreotti IV indicates the fourth cabinet headed by Mr. Andreotti (from 11-03-1978 to 31-01-1979). This is quite a standard convention in most political science literature. To be considered as such, parties must be characterised by a specific name and policy platform and have autonomous decision-making bodies. So, for instance, the Christian Democratic Union (CDU) and the Christian Social Union (CSU) in Germany are considered as two distinct parties, although their elected representatives form a unique group in the Bundestag. Finally, as already specified in footnote 2, the political data-set I have constructed for this research will be soon made available on the WWW. In the meantime, I will be happy to provide the interested reader with the data necessary to replicate the results discussed in the Chapters that follow.

1. A DATA-SET FOR THE ECONOMETRIC ANALYSIS OF THE INTERACTION BETWEEN POLITICS AND ECONOMICS.

> *"So, do you already have an idea of where you can find the political data you need ?"* (Prof. Muscatelli to an enthusiastic PhD student; office of Prof. Muscatelli, quite a long time ago).
>
> *"...a PhD in applied political economy ? Boy, you ought to find some good data"* (an old friend of mine, private conversation in a pub in Ashton Lane, Glasgow).

The goal of this thesis is the analysis of political bargaining, cabinet survival and decision-making in the western European coalition systems. Its econometric focus requires the construction of a data-set of empirical measures for the appropriate representation of the political and institutional factors formalised in the theoretical models of government creation, government duration and fiscal policy formation. This first Chapter describes the data-set and discusses some of the main issues concerning the definition of the variables, their use and interpretation. The starting point is, of course, the large amount of information already available in the literature on the empirical testing of political economy models. However, to better reflect certain dimensions of the political process which are of key importance in the models I investigate, quite a large number of "new" indicators have been defined and time series constructed for all the thirteen western European coalition systems. In doing that, attention has been devoted to the problem of linking empirical definitions to theoretical concepts; that is, to give empirical measures a solid theoretical underpinning. The first Section of the chapter specifically discusses this methodological point. A quick discussion of the sources of raw data used for the construction of the data-set is then given in Section 1.2. Section 1.3 presents an overview of the data-set, with the description of the various categories of variables and an intuitive discussion of the role they play in theoretical models. Details on the technical definition of individual variables and computational procedures are given in the Appendices to the chapters where these variables are used. Finally, Section 1.4 contains some descriptive statistics and preliminary evidence on a few selected political indicators. Appendix A1.1

discusses two technical issues concerning the frequency of observation of the data and the determination of Left-Right ideological scales for parties and governments. Appendix A1.2 contains some additional explanatory notes.

1.1 A methodological issue: the need for theoretical foundations of empirical political indicators.

To investigate the way in which politics and economics interact, theoretical models in political economy combine the representation of some relevant aspects of the economy (i.e. the inflation/unemployment trade off, the process of economic growth, the accumulation of public debt) and of the underlying political process (i.e. the electoral competition, intra-government bargaining, lobbying by pressure groups). When taking those models to the data, the construction of appropriate empirical measures to proxy the political and institutional factors of interest becomes a crucial task. The problem is essentially one of providing a quantitative dimension to qualitative (or eventually not directly measurable) phenomena and the solution usually involves tackling some subtle difficulties. On the one hand, one might want to define the empirical proxies in such a way that they can be easily computed from raw data on electoral results, government composition and ideological location of political parties currently available in the literature. On the other hand, there is the obvious need to make these proxies consistent with the structural representation incorporated in formal models. This duality implies that often the same theoretical channel can be empirically represented in two or more ways and econometric results might be sensitive to the choice of the specific representation.

As an example of the type of issues involved, consider the case of *political polarisation* in the well-known war of attrition set up proposed by Alesina and Drazen (1991). In a nutshell, the authors investigate what determines the timing of fiscal stabilisation in a small open economy where the government finances public expenditure through a mix of seignorage (or some form of highly distortionary taxation) and fiscal deficit. This mix generates high inflation and a growing stock of public debt. Stabilisation consists in the introduction of a new, non distortionary (or less distortionary) tax to bring deficit to zero, so that public debt remains constant ever since. The political problem is that the non distortionary tax burden cannot be equally divided between the two socio-economic groups that constitute the society. More specifically, one of the two groups has to assume the share $\alpha > ½$ of such a burden. This

parameter α can be interpreted as the degree of political polarisation in the society: the closer it is to ½, the less polarised the society. The strategic interaction between the two groups is solved as a war of attrition; the key result is that the timing of stabilisation (that is, the time required for one of the two groups to accept bearing the larger share of post-stabilisation taxes) depends upon a set of parameters amongst which there is the degree of polarisation α. In particular, as α approaches 1 (max polarisation), the length of stabilisation delay increases, so that *ceteris paribus* countries characterised by a higher α should experience larger deficits, faster debt accumulation and higher inflation. In this sense, the theoretical model yields a clear-cut prediction that can be empirically tested. A possible form for this test would be running a panel (or eventually cross-country) regression of the annual change of the debt to GDP ratio on a set of control variables plus an empirical proxy for α. The problem is how to define this proxy.

A first possible solution comes from the political science literature. Powell (1982) empirically defines polarisation as the total share of seats in the parliament held by political parties with an "extremist" orientation; that is, parties that explicitly pursue a radical change of the socio-political status-quo. In fact, although they are assigned the same name, the theoretical concept introduced by Alesina and Drazen (1991) and the empirical one suggested by Powell (1982) appear to have different contents. The former refers to the different policy views of the various agents participating into the decision-making process; the latter measures the degree to which the extremes of the party system (left and right) are important relative to the centre, independent from whoever is actually in charge of policy formation.

An appropriate empirical definition for α is thus one that adheres to the context analysed in the theoretical model and hence that provides information on the degree of political cohesion of actors involved in the decision-making process. The *index of dispersion of political power* proposed by Roubini and Sachs (1989) seems to provide such information. This index is constructed as a qualitative variable, taking value 0 for one-party majority governments, 1 for two-party majority coalitions, 2 for coalitions of more than two parties and 3 for minority governments. Innate to the coding of the index is the assumption that minority cabinets experience the greatest difficulties in completing the process of policy formation successfully and that impasse and inefficiency in decision-making increase with the number of parties in the government. Alesina, Roubini and Cohen (1997), for example, use this index in their analysis of

political determinants of budget deficits and obtain results consistent with the theory of war of attrition.[1]

One problem with the Roubini and Sachs' index is that its estimated coefficient cannot be given the usual partial derivative interpretation, unless the assumption is made that the effect on the dependent variable of the increase in dispersion associated with moving from a one party government to a two party coalition is the same as the effect associated with moving from a two-party coalition to a more than two-party coalition, and from a more than two party coalition to a minority government. Unfortunately, this assumption is not necessarily acceptable. To overcome this problem, the notion of *effective number of parties* (Laasko and Taagepeera, 1979) may be considered. The effective number of parties is an index of fragmentation obtained as the inverse of the sum of the squared shares of total coalition seats held by each coalition member (of course for single party governments, the index is equal to 1). The relative advantage of this index is that it takes into account the different size of political parties. Indeed, it could be argued that the difficulty in completing the process of decision-making changes depending on whether the coalition is formed by two parties of equal size or by one large (dominant) party and one small party.

The effective number, perhaps combined with a simple indicator of the share of parliamentary seats controlled by the ruling coalition, represents a good econometric proxy that can be used in the implementation of a test of the theoretical war of attrition model. However it can be yet further improved upon. As a matter of fact, neither Roubini and Sachs' index of dispersion of political power nor Laasko and Taagepeera's effective number of parties take the ideological preferences of political parties into account. Instead, in the theory of Alesina and Drazen, policy views do play a central role. The model, in fact, suggests that stabilisation delays arise not just because there are two (or more) constituencies and hence two (or more) parties involved in policy-making, but because these constituencies and hence these parties hold different policy interests: each would like a fiscal reform structured in such a way that its burden mostly falls on the shoulders of the other(s). Henceforth, there is a *conflict of interest* between the actors contributing to decision making. The length of the stabilisation delay, and hence the extent to which debt accumulates and prices grow, is proportional to the size of this conflict: more ideologically heterogeneous governments are expected to find it more difficult to undertake successful fiscal stabilisations. An empirical indicator which

[1] It is not the purpose of this Section to survey the literature in this field. The interested reader can refer to the discussion in Chapter 4 where these issues are investigated in details.

proxies for the degree of conflict of interest can be obtained from the raw information incorporated in the ideological policy scales available from the applied political science literature. On these scales, each party is identified by a specific cardinal location, that is a number that represents party's ideology on a Left-Right continuum. For each government, a distribution of locations can thus be generated by looking at the location of each individual coalition partner. Then a measure of the dispersion of this distribution (i.e. the variance) can be taken as an indicator of the size of the conflict of interest within the coalition. If the underlying institutional framework is one where not just parties within the government, but also opposition parties contribute to shaping policy outcomes, then the dispersion of policy locations of all parties in the system ought to be considered. The resulting indicator of *ideological heterogeneity* appears to be strictly adherent to the concept of polarisation introduced by Alesina and Drazen and it can therefore be used to test the theoretical prediction that more polarised countries run less tight fiscal policies. [2]

As the above discussion should suggest, political empirical measures must be related to a specific theoretical context. This methodological stance has been adopted in the construction of the data-set I used for the empirical analysis of the next chapters. In the absence of any solid theoretical underpinning, the econometric results become of ambiguous interpretation. Unfortunately, theory based measures are sometimes difficult to construct, given the impossibility of observing and measuring certain phenomena, so that some concessions must be made to practical convenience. The possibility of giving different interpretations to the same theoretical model and the limited availability of raw information on observable events thus imply that several alternative empirical proxies could be designed to represent any given political factor of interest.

In the light of these considerations, the political data-set has been designed to include a broad range of empirical indicators, each reflecting a particular aspect of the political framework as it is represented by theoretical models. Links between the theories and the indicators as well as the motivation underlying the choice of specific measures are emphasised in the next chapters. Such links constitute the basis for the formulation of ex-ante predictions concerning the sign of estimated coefficients and for the ex-post interpretation of the results. Sensitivity analyses are also conducted in order

[2] The measure of conflict of interest here proposed has its roots in the seminal work by Axelrod (1970). Details on the construction of Left-Right policy scales can be found in the Appendix to this Chapter.

to assess how results change when the same theoretical concept is represented by different empirical measures.

1.2 Sources of raw data for the construction of the political data-set.

The construction of the political data-set has required raw information on the timing of elections and composition of legislatures, on the structure of portfolios allocation, on the partisan membership of individual ministers, on the ideological location of political parties. This Section shortly describes the basic sources that I have used.

Mackie and Rose (1991 and 1997) collect electoral results for industrial democracies since the beginning of the century and this is therefore the obvious reference for data on election dates, distribution of votes and distribution of seats. They also provide, for each country, a brief summary of major political events (such as changes in the form of the State, modifications of the electoral law and so on) and a list of parties, with the indication of splits, breakaways and mergers. This latter bit of information is particularly useful for countries characterised by a high degree of fragmentation of the party space and continuous creation and disruption of political formations. The data provided by Mackie and Rose have been cross-checked with those in Mair and Katz (1990) and, for the last decade, with those in the *Political Data Yearbook* (various issues). A further check has been carried out by comparing the elections date in Mackie and Rose with those reported in the Appendix to Chapter 6 of Alesina, Roubini and Cohen (1997).

Woldendorp et al. (1993 and 1998) is the primary reference for data on the composition of governments. For the group of countries that have experienced an uninterrupted post-war history of democratic party-government, Woldendorp, Keman and Budge collect information concerning the date of formation and the date of (and the reason for) termination of each cabinet, the composition of the supporting coalition, the name and partisan membership of the prime minister and the name and the partisan membership of each individual minister. They also classify governments on the basis of their type (for example they separate *caretaker* governments from ordinary ones) and on the basis of the ideological orientation (left, centre or right) of the legislature and of the ruling coalition. The widespread interest received by the first edition (1993) has implied that country experts have double checked the original information and suggested corrections incorporated into the second edition (1998). This in turn guarantees the

quality and the precision of the data. Moreover, I have used the *Keesing's record of world events* (various issues) to further ensure the accuracy of the data on the composition of the coalitions, the allocation of the main portfolios and the dates of beginning and end of office. Keesing's archive has also been used to compute the duration of the process of government formation.[3] Finally, the information on the sequence of government transfers has been further checked using the data provided by Alesina et al. (1996), whose data-set is available on the web at the page *www. nuff.ox.ac.uk/.*

The data-set of this thesis extends from 1945 to 1999. In the printed sources above described, including the Political Data Yearbook, the last year covered is usually 1998. Thus, for the most recent information I have referred to the web. The electoral page at *www. agorà.stm.it* contains, for almost all countries in the world (including those where democratic institutions are not fully effective), up-to-date electoral results, a directory of parties with a brief statement of their ideological orientation and links to national parliaments and governments that can be used to obtain details on the composition of the incumbent cabinet.

Information on the ideological location of political parties is necessary to construct some of the measures in the data-set (such as, for instance, the index of conflict of interest mentioned in the previous Section). In the applied political science literature, this type of information is usually made available in the form of empirical policy scales. On these scales, parties are assigned a specific position (i.e. a number included between 1 and 10, where 1 is extreme left and 10 extreme right) depending on the ideological content of their policy views as specified in electoral manifestos. The Appendix discusses some of the issues concerning the construction of such scales and the criteria I have adopted to select the four basic sources of ideological data: Dodd (1976), Browne et al. (1984), Castles and Mair (1984) and Huber and Inglehart (1995). These are all cross-country studies that report the cardinal locations for almost all parties in the political arena active during a given spell of time (for example, Dodd explicitly focuses on the two decades from 1950 to 1970, Castles and Mair on the '70s and early '80s, Huber and Inglehart on the early '90s). Additional qualitative information on the ideological orientation of minor parties not included in the studies just mentioned has

[3] Daniel Diermeier kindly made available to me the data-set that he and Van Roozendaal used for their analysis of government formation durations (Diermeier and Van Roozendaal, 1998). However, the fact that they refer to a theoretical context different from the one I consider implies that they adopt criteria for the identification of the start and the end of negotiations which are different from those I have to use. Thus, I preferred constructing my own series. More details on this issue can be found in Chapter 2.

been obtained from *Political Parties of the World* (Keesing's Publications, 1985), Mackie and Rose (1997) and the directories of parties in the electoral page at *www. agorà.stm.it.*

1.3 From the theory to empirical political indicators: categories of variables included in the data-set.

The data-set includes variables specifically designed to represent those political and institutional factors that theoretical models emphasise as being of interest for the three issues under investigation in this thesis: the process of bargaining over cabinet formation and portfolios allocation, the determinants of government duration in office and the role of political bias in fiscal policy decision making. All in all, the data-set contains more than 50 indicators. General definitions, links to the theories, ex-ante expectations concerning the sign of the estimated coefficients and ex-post interpretations of the results are stressed for each individual variable used in the econometric analysis in the chapters to follow. Appendices to each chapter will also give further technical details on the computation procedures, especially for those indicators that have never been previously defined in the literature. This Section, instead, is meant to provide a general overview of the contents of the data-set by first quickly surveying the main arguments embodied in the theoretical models and then discussing the main categories in which variables are grouped.

1.3.1 An overview of the main theories on cabinet formation, government duration and fiscal policy making.

A voluminous theoretical literature has been now produced on each of the three issues at stake. The purpose of this Subsection is neither to provide a full account of all contributions nor to investigate formalised models. More complete surveys of the literature (including details on the references) as well as descriptions of the technical settings are left to the subsequent chapters. Here, the goal is to discuss in informal terms the bulk of the arguments incorporated in the theories that will constitute the guidelines of the empirical analysis to follow. This discussion is useful in highlighting the *dimensions* of the political process that ought to be represented through a set of quantitative indicators. Each indicator will capture a specific aspect of one (or eventually more than one) dimension and it is therefore logical to group variables in the

data-set according to the dimension whose aspects they are meant to represent. Thus, each dimension is associated with a category of variables in the data-set.

1.3.1.a. Theories of government formation and portfolios allocation

In coalition systems, government formation (as well as disruption) occurs through a complex process of bargaining among political parties. The study of the characteristics and possible equilibrium outcomes of this process has been the object of a vast literature since the seminal work by Von Neumann and Morgenstern (1944). Most recent theoretical contributions in this area develop along one of the three following routes. The first possible approach (see, for instance, Merlo, 1997) is to consider office related benefits as a cake and then model political bargaining as a problem of optimal allocation of this cake, given that each party's utility function is increasing in the slice of the cake received. The second route (see, *inter alia*, Baron, 1991 and Diermeier and Merlo, 1998) builds on the assumption that parties bargain directly over policy outcomes, so that government can be characterised in terms of a policy proposal supported by the majority of legislators in a motion of confidence. The third approach (see Laver and Sheplse, 1996) moves from the empirical observation that decision making in several countries displays a strong *departmental character*; that is, the contents of policy decisions in any given area of the policy space tend to reflect quite closely the policy preferences of the party in control of the portfolio whose jurisdiction extends over that particular area.[4] Given this departmental character and the incentive of a party to defend its own public policy positions (for either ideological or purely opportunistic reasons), government formation can be modelled as a bargaining over the allocation of a small set of *key portfolios*, whose jurisdiction involves the dimensions of the policy space regarded as the critical ones by both voters and politicians (i.e. economics, foreign affairs, interior, justice). The basics of each of these three approaches are described below.

Models of bargaining over the allocation of a cake build on Rubinstein (1982 and 1985a,b). Parties are assumed to be interested in the appropriation of patronage and office related benefits. In the simplest possible terms, the amount of patronage and benefits enjoyed by any party is proportional to this party's share of cabinet posts. The

[4] Laver and Sheplse (1994) provide comprehensive evidence to sustain this view, which was originally put forward by Austin Smith and Banks (1990) and Laver and Shepsle (1990).

set of cabinet posts is thus regarded as a cake of fixed size and parties bargain over the allocation of this cake with the objective of obtaining the largest possible slice. The bargaining procedure is one of alternating offers. A first-mover (the *formateur* party) is appointed by a non-strategic Head of the State. The formateur selects a proto-coalition[5] of potential partners and makes the first proposal for the allocation of the cake. If accepted by all partners, then the proposal is implemented and the cabinet formed. If instead, any of the partners rejects it, then a new proposal must be made by another member of the proto-coalition, following an exogenously given order. Negotiations continue until either a proposal is made and accepted by all parties in the proto-coalition (which thus become an effective ruling coalition) or the Head of the State, having observed the inability of the proto-coalition to find an agreement, decides to re-start the process with a new formateur and possibly a new proto-coalition (alternatively, new elections might be called). In this latter case it is said that the formation attempt failed.

Casual observation of real world politics suggests that public opinion often attributes most of the responsibility of a failure to the formateur party, which is therefore politically blamed more than the other potential partners. Moreover, in the case of a success, the formateur goes on playing a central role in the government, often retaining the office of prime minister. This implies a peculiar status for the formateur in the bargaining game: it will value a success and fear a failure more than its partner in the proto-coalition. In the model, the likelihood of failure increases as the bargaining environment becomes more complex (i.e. as the effective number of parties taking part in the negotiations grows) and the duration of the negotiation increases, following continuous rejections. Faced with such events, the formateur is more willing to reduce its demands, conceding larger shares of the cake to coalition partners in order to facilitate the agreement. Such an incentive is stronger the weaker the position of the formateur as reflected by its parliamentary size, or by the centrality of its location in the policy space. This result can be submitted to econometric testing once information over the attributes of the formateur, the outcome of the bargaining process and the composition of the (proto)coalition are available.

The basic idea incorporated in models of bargaining over policy outcomes is that the government is formed when the members of a proto-coalition agree on a common

[5] The term proto-coalition identifies the set of parties in the ruling coalition before they have actually achieved an agreement and hence before the government is effectively formed.

policy proposal whose contents are detailed in a coalition treaty (or coalition agreement) that represents the master-plan of government action. Clearly, if partners in the proto-coalition all sustain the same policy platform, then this platform represents the equilibrium policy for the bargaining game and no discrepancy between the policy implemented by the cabinet and party's ideal policy arises. If instead, as seems to be most often the case, policy platforms of parties diverge, then an agreement necessarily requires making costly "ideological concessions". In other words, any party must move away from its preferred policy and accept a compromise with the other partners. But, at the same time, every party has the incentive to make as few concessions as possible and to hold out for a compromise closest to its preferred policy. How successful a party will be in this effort depends upon its relative *strength*. Strong parties are ready to bear the political and opportunity costs associated with long bargaining and concede very little at each round of negotiations. Weak parties are instead less willing to delay agreement and can accept compromise policies which are significantly different from their own preferred ones. The nature of players thus determines how far the policy agreement is from individual party's ideal policy; that is, how *balanced* the outcome of the negotiation process is. If players are all strong, then the compromise is likely to lie at some intermediate distance from players' preferred policies, but the low rate of concession implies a long time required for this compromise to be reached. If players are all weak, then the compromise is again intermediate, but now the rate of concession is high and hence negotiations should last for a shorter spell. If players are of different nature between one another, then the compromise will be unbalanced, in the sense that it will be closer to the policy preferences of some and quite a distance away from the ideal policies of others. The time required to achieve the agreement will be less than in the case of all strong players, but higher than in the case of all weak players. Henceforth, the relationship between degree of balance of the outcome of bargaining and duration of negotiations should be U shaped. A test of this prediction requires data on the duration of cabinet formation processes, on some key attributes of the coalition (one needs to control for the number of parties, their relative size, their degree of ex-ante ideological heterogeneity) and some operationalisation of the concept of degree of balance of the bargaining outcome.

Models of bargaining over the allocations of key portfolios are based on the assumption that cabinet decision making is characterised by a strong departmental character. This means that policy decisions made on some given issue essentially

represent the policy preferences of the party in control of the specific portfolio whose jurisdiction extends over that issue. In these models, parties are again assumed to be concerned about policy contents (either as the result of some true policy concern or simple opportunistic considerations), but they do not maximise their utility function through bargaining on policy proposals. Instead, they are aware that to obtain policy outputs close to their ideal policies they need to obtain control of key portfolios. Cabinet is formed only when an agreement over the allocation of the key portfolios is achieved. Notice the difference from the models where parties bargain over the division of a cake. There, what matters is the *quantity* of cabinet posts, here it is the *quality*. In other words, it matters "who gets what".

In Section 2.2 I propose an original version of the war of attrition game applied to the case of bargaining over a small set of key portfolios. To simplify the discussion, suppose that there is only one key portfolio to be allocated and n parties in the proto-coalition.[6] Negotiations start with each party demanding control of the key portfolio. Then each party holds out, waiting for someone else to give up first. Since there are political and opportunity costs associated with delaying agreement, each party is willing to wait only for a finite time. Incomplete information on the true nature of parties is assumed, so that *optimal waiting times* are not publicly known ex-ante. The game ends, and the cabinet is formed, when all but one of the players have given up their demand. The key portfolio is thus assigned to the only survivor. This will be the party of toughest nature, i.e. the one for which it is more important to defend ideological stances and/or bargaining is less costly. However, a clear-cut prediction of the model is that, whoever the winner is, the total time required for the conflict to be resolved is proportional to the degree of ideological dispersion of the policy preferences of parties in the coalition. The intuition behind this result is indeed quite simple. Not controlling the key portfolio means that a party accepts a policy outcome different from its own ideal policy. The larger the dispersion of policy preferences, the higher the risk that the gap between the party's ideal policy and the actual policy output is large. Since the utility of each party is inversely related to the size of that gap, a higher risk of a large gap induces all contestants to hold out a little longer in the hope of avoiding defeat. Data on cabinet formation duration, ideological location of political parties and composition of ruling coalitions can be used for an econometric testing of this theoretical prediction.

[6] As discussed in Chapter 2, this assumption is much more realistic than it may first appear.

1.3.1.b Theories of government duration

The common view in the theoretical literature is that governments are the outcome of a legislative bargaining process. Theories of government duration essentially make use of non-cooperative game theory to investigate the factors that make a government agreement more or less stable and to highlight the circumstances under which the incumbent coalition is more likely to become no longer viable. The general institutional framework they consider is one of a parliamentary democracy where the survival of the cabinet is linked to the acceptance of government's bill by the parliament (see Diermeier and Feddersen, 1998 and Diermeier and Merlo, 1998 for two recent examples).

The parliamentary nature of the system implies that the incumbent cabinet has to pass legislative challenges in the form of motions of confidence. Durability in office is therefore strictly linked to the ability of the government to win confidence votes. The conventional wisdom expressed by early coalition theorists is that this ability depends upon the government having the support of a legislative majority. That is, the majority status is necessary, although it may be not sufficient, to ensure long lasting cabinets. A corollary of this argument is that minority governments are to be regarded as pathologies deemed to last over only limited spells of time. Taking the argument one step further, it can be sustained that the life-expectancy of any cabinet is positively related to the parliamentary size of the supporting coalition: the larger the base of votes in the legislature on which a government can rely, the less likely it is that a motion of no-confidence tabled by the opposition will pass (see Strom, 1990, for an overview of this literature and a challenging view).

In fact, recent theoretical developments have emphasised that, more than control of a legislative majority, what really enhances the ability of the government to win confidence votes is the inclusion in the ruling coalition (as an office-sharing partner or even as a simple external supporter) of a *pivotal party*. Following Van Roozendaal (1993), the pivotal party can be characterised as the one including the median legislator; that is, the pivotal party coincides with the median party. Given an ideological ordering of political parties from Left to Right and a distribution of seats, the median party in any legislature can be identified as the one whose share of seats added to the share of seats of the party on its left makes the cumulative sum of shares larger than the 50% threshold. This median (or central) party is pivotal in the sense that no ideologically connected coalition can be formed without its participation. The important implication

is that a minority government that is supported by the median party can be beaten in a confidence vote only by a non connected, and hence difficult to form, opposing coalition. The prediction follows that cabinets sustained by a coalition including the median party are more durable, especially if the median party effectively shares office responsibilities.

The median party argument is essentially based on the theory of *conflict of interest* as originally developed by Axelrod (1970) and De Swaan (1973). The bulk of this theory is that any coalition is at risk of breaking down because of the potential for internal disagreement. However, the likelihood that such conflicts will occur is higher, the more ideologically diverse the parties are. Indeed, unless parties have defined a perfect contract at the time of cabinet formation, the decision making process will involve negotiations among partners over the contents of the policies to be undertaken. If these partners hold different enough policy views, then the process of policy formation could come to a halt and internal attrition might be the cause of a government collapse. It then follows that durability in office is expected to be inversely related to the degree of ideological heterogeneity and fragmentation of the coalition. In other words, a larger number of actors and/or wider divergence of policy platforms are two factors that undermine the stability of the coalition.[7]

Another crucial element in understanding the life-expectancy of the government is the existence of alternatives to the incumbent status-quo. As a matter of fact, before taking internal disagreement to a point of no return, any party should rationally investigate the various alternative scenarios that are likely to arise, in the case of a coalition collapse. When a government terminates, then one of two courses of action are feasible: either a new cabinet is formed (and this may or may not involve a change in the ruling coalition) or new elections are called. Now, parties in the ruling coalition might dislike the first option for several reasons. They could, for example, fear being excluded from the new coalition or, even if included, be uncertain about whether or not the new coalition agreement will be better than the status-quo. At the same time, they could be unwilling to take an electoral test since voters would be likely to punish them for the government failure (a sort of anti-incumbency effect). More generally, the composition of the parliament could be such that no alternative viable coalition can be

[7] Notice that if it is true that coalitions are usually composed by partners in the same ideological neighbourhood, it is also true that ideological differences need not be extreme for intra-coalitional conflicts to arise. This point is well made by Scharpf (1997). He argues that though all parties in a coalition do have a common interest in the success of the government, each of them has a separate interest in maintaining its political identity and in standing for the specific interests of its supporting constituencies, even at the risk of an electoral loss or a coalition collapse.

formed to support a new government and at the same time anticipated elections might be regarded as a negative event by the political actors. If this is the case, then the incumbent government might survive in office (although incapable of successfully completing the process of policy formation) in spite of the ongoing intra-coalition conflict.[8]

A common feature of several theories is that the duration of a cabinet depends not just on structural political factors (such as the status and fragmentation of the coalition or the composition of the legislature), but also on stochastic events; that is, on changes in the environment that occur according to a stochastic process (usually, a Markov process). This is, for instance, the case in Diermeier and Merlo (1998). In their setting, a cabinet is formed when parties in a proto-coalition achieve an agreement on a common policy proposal and a vector of transfers to be paid to non proto-coalition members to obtain their support. These transfers can be interpreted as perks, valued by opposition parties and distributed by the government – i.e. prominent positions on boards of state-owned business or national television. The structure of the agreement (that is, the location of the common policy proposal on the policy space and the size of the transfers) determines the equilibrium allocation of a cake whose size depends on both the composition of the coalition and a *default policy*. This default policy represents the state of the environment and every period it changes following a Markov process. Different realisations of the default policy might generate the incentive for parties in the ruling coalition to renegotiate the initial agreement and this renegotiation might fail. If this is the case, then a government termination, induced by a change in the environment, is observed.

The type of environment which is probably most relevant for the analysis of cabinet duration (besides the political environment, of course) is the economic environment. In this sense, Diermeir and Merlo suggest interpreting the default policy in their model as the current state of the economy. It then follows that positive economic conditions (i.e. high employment, low inflation) foster government durability. Henceforth, to the extent that government policies affect the state of the economy, the survival of the cabinet is endogenous to cabinet's performance in office. This result does indeed appear to be quite plausible. Building on the theory of *labour quiescence* first proposed by Cameron

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[8] An example of how political actors might dislike (for various reasons) anticipated elections was given by late Mr. Sandro Pertini, President of the Italian Republic between 1978 and 1985. Facing a particularly difficult government crisis, he made it clear that he would not tolerate a second anticipated election during his term of office, thus forcing coalition leaders to settle internal disagreements.

(1984), Boix (1998) argues that the ideological orientation of the government is an important determinant of its ability to score a positive economic performance. In simple terms, unions have more moderate wage demands when bargaining with left-wing governments (typically more focused on employment growth than on price stability). This moderation prevents inflation from creeping up when expansionary fiscal polices are undertaken in order to stimulate production and employment. The result is that a left-wing government delivers high employment rates associated with low inflation, henceforth the ideological orientation of the cabinet would be a determinant of its own duration in office.

1.3.1.c Theories of political determinants of fiscal policy outcomes

Economic models of optimal budget policy posit that budget deficits and surpluses should be used to minimise the distortionary effects of taxation, given a certain path of public spending (see Barro, 1979 and Lucas and Stokey, 1983). The implication of this *tax smoothing approach* is that deficits generated during the negative phase of the cycle should be compensated by surpluses realised during the positive phase, thus preventing excessive accumulation of public debt. However, the persistence of deficits and the fast growth in the stock of debt observed in a large number of countries since 1960 suggest that other factors might be at work. In particular, the fact that fiscal policy decisions are not made in a political vacuum has recently led scholars to investigate possible politico-economic explanations of the evolution of deficit and debt. A few theories have thus been generated that point out the existence of various forms of political bias in fiscal policy formation.

A traditional argument in the literature builds on the assumption that myopic voters favour expenditures but do not want to pay for them. Failing to understand the implications of the intertemporal budget constraint of the government, these voters can be "fiscally illuded" by opportunistic (i.e. purely electoralist) incumbents, who will run larger deficits as elections approach in order to maximise their chances of re-election (see, *inter alia*, Buchanan and Wagner, 1977). The argument is thus close in spirit to the tradition of the political business cycle as formalised by Nordhaus (1975). It predicts that the size of deficit and public expenditures depends upon the timing of elections: a more expansionary fiscal policy should be observed in pre-electoral periods. Moreover, the overall preferences of voters for expenditures *vis-à-vis* taxation would ensure

persistence of deficits and debt accumulation above the level consistent with the tax smoothing approach.

Non purely electoralist parties add ideological considerations to opportunistic motives. When an incumbent government that cares about policy contents faces a positive probability of being replaced in the near future by a coalition with different policy preferences, then an incentive for this incumbent exists to use fiscal policy strategically (Alesina and Tabellini, 1990; Tabellini and Alesina, 1990). The basic argument incorporated in this type of models is that to avoid the loss associated with having the preferred policy of the opponent undertaken, the incumbent chooses today a course of action that ties his potential successor's hands tomorrow. Suppose, for example, that policy views are different in the sense that the two coalitions want to supply different public goods. Then, by running a large deficit today, the incumbent forces the future government to spend less resources in the provision of public goods. That is, a smaller amount of the incumbent's non-preferred public good will be produced after the incumbent has been replaced. The key result is thus that in the presence of a high turnover of fiscal policymakers, deficit should be larger.

The assumption that parties not only care about office, but stand for some specific ideal policy and try to implement it also implies that fiscal policy outputs will be different depending on the ideological orientation of the incumbent. In this sense, the common view is that more left-wing governments tend to favour more expansionary fiscal policies. It then follows that the size of deficit, public expenditures and taxation to some extent reflect the political colour of the incumbent. In other words, the alternation in office of parties of different ideological background would generate an alternation of fiscal outcomes.

Another political economic theory of the persistence of deficits focuses on the dispersion of political power within the ruling coalition. When several actors contribute to the process of policy formation (as it is likely to be the case in a coalition government, especially if decision making does not display a strong departmental character), then the heterogeneity of policy views can cause stalemates and heavy distortions to the process itself. The argument builds on the model by Alesina and Drazen (1991) mentioned in Section 1.1 of this Chapter and leads to the conclusion that more ideologically fragmented coalitions should produce larger deficits. A similar result arises within a common property framework (Velasco, 1998 and Drazen, 2000). If government revenues are regarded as a common pool from which all partners in the coalition can obtain resources for their supporting constituencies, then total

expenditures will be set in excess of revenues. Of course, parties could realise that this "fishing from a common pool" will produce inefficient debt accumulation over time and decide to co-operate towards fiscal rigour. But the decision to co-operate becomes individually optimal only when debt becomes too high. Moreover, the larger the number of agents involved, the more difficult it is to achieve and maintain co-operative behaviour. Thus, more fragmented coalitions tend to be associated to greater spending and larger deficits.

The common property model can be extended to account for an empirical regularity observed by Grilli, Masciandaro and Tabellini (1991), namely that in countries with a proportional representation system, the rate of debt accumulation is higher. The idea is that access to the common pool might not be exclusive to parties in the governing coalition, but granted to all parties in the parliament. To the extent that the proportional representation system favours the fragmentation of the legislature relative to the plurality system, the number of parties fishing from the pool would be larger in countries where the proportional rule applies, thus deepening problems of co-ordination.

Another institutional factor that can be considered for a political explanation of deficit and expenditures is the structure of the *budget process*. This indicates the set of rules and arrangements that govern the process of budget formation. Intuitively, the existence of long-term planning constraints (such as the quantitative fiscal rules imposed by the Maastrich Treaty to EMU member-states) should prevent excessive debt accumulation and enforce fiscal rigor. Similarly, a hierarchical process of formation, centralised in the hands of a powerful prime minister or minister of finance, or the commitment to negotiated fiscal targets defined in contract agreed upon by coalition partners should both generate smaller deficits (Von Hagen, 1992).

1.3.2 Categories of indicators in the data-set

The informal discussion of the previous Subsection emphasised the dimensions of the political process that ought to be the most relevant in the analysis of issues concerning cabinet formation, cabinet duration and fiscal policy decision-making. These are indeed the dimensions for which an empirical representation must be designed and hence they implicitly define the categories of variables included in the data-set.

The theories of political bargaining over cabinet formation stress the critical role of the structure of both the coalition and the parliament. They also suggests that attention should be devoted to the attributes of the formateur and that a relationship can be

identified between the degree of balance of the outcome of negotiations and the duration of the bargaining process. Models of government turnover again emphasise the importance of various attributes of both ruling coalitions and party system. Factors pertaining to the ideological distribution of policy preferences also come into play. Finally, political explanations of fiscal deficits and expenditures focus on the timing of elections, the degree of intra-coalition conflict, the observed and expected volatility of policymakers and their ideological orientation, the institutional arrangements concerning budgetary procedures and electoral rules.

All in all, the variables necessary to capture the above mentioned dimensions can be grouped in the following categories: (i) *structure and fragmentation of the ruling coalition,* (ii) *composition and polarisation of the parliament*, (iii) *ideological location of parties and governments*, (iv) *attributes of the formateur parties*, (v) *background and history of the coalition*, (vi) *volatility of policymakers and legislators*, (vii) *institutional arrangements*. Below, an overview of each category is given. Details on the definition of each individual variable and its links with the theories are discussed in the chapter where the specific variable is used.

1.3.2.a Measures of the structure and fragmentation of the ruling coalition

This category includes indicators aimed at representing the status of the coalition in term of its size (i.e. majority or minority), the number of coalition partners and their ideological dispersion and the potential for intra-coalition conflictuality. The variable *share of seats* (SH) gives for each government in the data-set the number of seats controlled by coalition partners as proportion of total parliamentary seats. Clearly, the majority status is realised for SH larger than 0.5. A dummy variable *majority* (MAJ) can then be coded as 1 when this condition is realised. The numerical fragmentation of the coalition is measured by the *absolute number of parties* (ANP), the *effective number of parties* (ENP) and the *real number of parties* (RNP). ANP is simply the number of partners in a coalition, counting each party as one. ENP, originally proposed by Laasko and Taagepeera (1979), is defined as the inverse of the sum of squared shares of sets hold by parties in the coalition. RNP is equal to ANP divided by the total number of key portfolios to be allocated. This latter index, RNP, has its rationale in the approach to cabinet formation as a problem of allocation of a small set of key portfolio. When the number of these portfolios is small relative to the players, then bargaining becomes more complex. None of the three indicators of numerical fragmentation, however,

explicitly takes into account the heterogeneity of parties' policy views. Since several theories do focus on ideological heterogeneity as a key factor of intra-coalition conflict and/or delayed agreement, a variable *conflict of interest* (CI) is also designed to represent the overall dispersion of the policy positions of parties on a hypothetical Left-Right continuum.

Most theories (especially those on cabinet durability) focus on the importance of potential intra-coalition conflicts. It is clear that such conflicts are more likely to arise when the coalition includes a larger number of parties and when these parties are ideologically diverse one from another. In addition to that, the relative parliamentary size of parties might play a role, although the direction of this effect might not be clear *ex-ante*. On the one hand, following a classical argument in theoretical biology (see, for instance, Maynard Smith, 1982), a conflict between players with different objectives is more likely to escalate when these players are of relatively equal size and hence strength. On the other hand, when political parties value parliamentary seats *per se*, the incentive for partners to break the existing coalition agreement is smaller the more balanced their relative parliamentary size. The variable *relative size of parties* (SIZE) is defined as the absolute number of parties in the coalition divided by the effective number of parties ENP. Negative coefficients on that variable would indicate that the first effect prevails.

The standard approach in the theoretical literature is to regard government as the outcome of a bargaining process. Then, its stability will also depend upon parties' incentive to renegotiate. It might well be the case that this incentive arises when the original agreement is to some extent unbalanced; that is, if the composition of the cabinet (or the contents of the policy proposal that identifies the cabinet) is such that some coalition partners are particularly disadvantaged compared to others. The data-set therefore includes an index of *degree of balance of bargaining outcome* (EVEN). Details on its definition and computational procedure can be found in the Appendix to Chapter 2, where EVEN is also used as the dependent variable in the test of one of the models of cabinet formation.

1.3.2.b Measures of composition and polarisation of the parliament

Similarly to what is done for the case of a ruling coalition, the structure of a parliament can be represented in terms of its numerical and ideological fragmentation. The variable *effective number of parties in the legislature* (FRA) is the counterpart of

the previously defined ENP. It is computed as the inverse of the sum of squared shares of total parliamentary seats held by all parties and hence it reflects the numerosity of players that could, for example, fish from a common pool of public resources or form coalitions alternative to the incumbent. However, it does not provide information on the degree of ideological dispersion of parties in the legislature; that is, on the overall degree of polarisation of the party system. In the applied political science literature, the standard definition of *polarisation* (POL1) is due to Powell (1982). According to this definition, polarisation is equal to the share of seats held by "anti-system" parties (criteria to identify "anti-system" parties are spelled out in the Appendix to Chapter 2). As noted in Section 1.1, POL1 is in fact an indicator of the importance of the extremes relative to the centre of the political spectrum, but it does not measure the extent to which the policy views represented in the parliament are ideologically distant one from another. For this reason the data-set includes two additional indicators, POL2 and POL3. The former is the average ideological distance between any two parties on a Left-Right continuum. The latter is the variance of the policy locations of all parties with parliamentary representation.

Theoretical models of cabinet formation and termination suggest that, in a parliamentary democracy, the ability of a government to survive is linked to its ability to face legislative challenges from the opposition in the form of no-confidence motions. Besides the size of the coalition (captured by the variable SH), a factor which is likely to matter in determining the result of such challenges is the degree of ideological cohesion of the opposition. Following the theory of conflict of interest already mentioned, coalitions of parties are more likely to form and sustain if members are ideologically connected. This implies that even if numerically large, a fragmented opposition might well be unable to find common ground to build a successful motion of no confidence. The variable *opposition concentration* (OPP) is defined following Strom (1984) as the number of seats held by parties on the numerically largest side of the opposition as a proportion of total opposition seats. In Chapter 3 however an alternative interpretation of the role of OPP is proposed which is based on a model by Lupia and McCubbins (1998).

1.3.2.c Measures of ideological location of parties and governments

For empirical purposes, the ideological location of political parties can be measured on a ten point Left-Right scale. Examples of such scales are commonly available in the

applied political science literature (see for instance Appendix B in Laver and Schofield, 1990 and Huber and Inglehart, 1995). Details on their construction and on the specific references adopted for this data-set are given in an Appendix to this Chapter.

Given the cardinal location of parties on the Left-Right scale, it is possible to construct an indicator of aggregate ideology of the government. This will be defined as the weighted average of the ideological locations of the parties involved in the process of policy formation. The system of weights for the computation of such an indicator should be chosen so that the weight assigned to each party correctly reflects this party's effective contribution to the decision making process. Political scientists identify four possible structures of decision making process that have some empirical relevance in coalition systems (Laver and Shepsle, 1994). For each of these four structures, a different system of weights is designed so that in the end four different indicators of *ideological location of the government/coalition* (LOC) are obtained. Appendices to Chapters 3 and 4 will provide additional technical details. The indicator LOC is used to test the hypothesis that labour quiescence will allow left-wing government to survive longer and that policymakers of different ideological orientation deliver different fiscal policies.

Information incorporated in Left-Right ideological scales can be combined with raw data on the distribution of seats in the parliament to identify the median party. Then, the prediction that governments supported by the pivotal median party live longer can be tested. As previously outlined, the median party is the party whose share of seats added to the share of seats of parties on its left (or right) makes the cumulative sum of shares larger than the threshold majority of 0.5. Then a dummy variable *median party included* (MED) is constructed and coded as 1 if the median party is a member of the ruling coalition. A second dummy *median party in prime minister office* (MEDPM) takes value 1 if the pivotal party occupies an important office (such as prime minister-ship) in the incumbent cabinet.

This category also includes a variable *median voter location* (MVLOC) which represents, on the usual ten point Left-Rght scale, the ideological orientation of the median voter. The technical procedure for its computation is detailed in Chapter 4. It is similar to the one described for the identification of the median party, the main difference being that raw data on shares of votes rather than on shares of seats are used. MVLOC will be used to see whether there is consistency between the preferences of the policymaker and the preferences of the electorate (as it should be in a representative

democracy) and, in case some discrepancy arises, which of the two counts for policy formation.

1.3.2.d Attributes of the formateur party

As noted in Paragraph 1.3.1.a of Subsection 1.3.1, the theory of allocation of the cake can be tested through an analysis of the determinants of the slice obtained by the formateur. This slice is represented by the *share of portfolios of the formateur* (SHP), computed as the proportion of portfolios received in equilibrium (i.e. when the formation attempt is successful) by the formateur party on the total number of portfolios that compose the cabinet. Alternatively, the slice might be defined in terms of the *share of key portfolios of the formateur* (SHK), defined as the number of key portfolios secured by the formateur as a proportion of the total number of key portfolios allocated in the cabinet.

Other attributes of the formateur that are of interest are those pertaining to the strength of its bargaining position and hence its ability to secure a larger or smaller share. In turn, the strength of the bargaining position depends on the formateur' s parliamentary size and ideological location. The *share of seats of the formateur* (SHS) accounts for parliamentary size and is given by the number of seats held by the formateur over the total of coalition seats. To reflect the size of the formateur relative to other coalition partners a simple dummy *large formateur* (DLARGE) is constructed which is coded 1 if the formateur is the largest party in the coalition. The dummy *formateur at the median* (DMEDF) takes value 1 when the formateur party is the median party and hence plays a pivotal role. The dummy *strong formateur* (DSTRONG) combines the previous two bits of information and is coded as 1 when the formateur is the largest in the parliament and at the same time occupies the median location.

1.3.2.e Indicators of the background and past history of the government/coalition.

Any government and/or coalition at the time of its formation is endowed with a legacy that arises from past experiences and the behaviour of its members. The time parties have spent to negotiate the coalition agreement constitutes, together with the political status of the cabinet and its time horizon to next elections, the background of

the government/coalition. Variables in this category account for this legacy and background.

For each cabinet, a variable *coalition expertise* (COALEXP) is constructed as the cumulative duration of all previous governments supported by the same coalition that supports the incumbent. Moreover, the variable *prime minister expertise* (PMEXP) is also defined as the cumulative duration of all previous governments headed by the same prime minister heading the incumbent. Both variables have originally been suggested by Merlo (1998) as indicators of the degree of expertise in office and hence of coalition leaders' ability to go through the various challenges in the political arena. A similar, albeit less detailed, informative content is incorporated in a dummy variable *coalition continuation* (COALC) which is equal to 1 if the incumbent cabinet is supported by the same coalition of parties that supported the previous one.

The *duration of the government formation process* (FORM) is the time parties have spent on bargaining over the structure of the cabinet (i.e. over the allocation of the cake, or the contents of the policy proposals to be implemented or the control of the key portfolios). The operationalisation of this measure requires criteria for the identification of the start and the end of the process to be defined. Diermeier and Van Roozendaal (1998) take the formal resignation of the previous cabinet (or the date of elections, if the forming cabinet is the first of a new legislature) as the starting point of negotiations. However, to ensure greater consistency with the theoretical formulation of Chapter 2, I consider the appointment of a formateur party by the Head of the State as the starting point. Negotiations are taken to end when the new cabinet formally enters office; that is when ministers swear-in or (in countries where constitutionally established) when the new governments receives a vote of investiture.

With respect to the political nature of the government, the basic distinction is between caretaker or non-aligned cabinets and political ones. The former typically consists of non-partisan members and pursue technical goals for a limited period of time (usually a few months immediately before elections). Their duties are often limited to taking care of the ordinary administration. The latter are instead based on political programmes and, other than the constitutionally established maximum term of office, they are not subject to any explicit time constraint or limitations of decision making powers. It is therefore clear that significant differences arise between the two types in terms of both the process of formation and their survival in office. For this reason a dummy variable *caretaker* is added to the data-set that takes value 1 for cabinets of explicitly caretaker (or non-aligned) nature.

The *time horizon to next elections* (TH) is the time between the formation of the cabinet and the next scheduled elections. Although early terminations are often observed in real world politics, some theoretical models (see, for instance, Merlo 1997) link time horizon to duration in office. In addition to this, the more distant in time elections are, the less likely the government is to adopt short-sighted policies mostly aimed at increasing its share of support. In other words, a longer time horizon to next elections could reduce the *myopia* of the incumbent. TH is obviously longer for the first cabinet of a new legislature. A dummy *first after elections* (FIRST) is therefore coded as 1 for the first cabinets of any legislature.

1.3.2.f Measures of political volatility

In measuring political volatility (or instability) it is important to consider not just the survival in office of governments and legislatures, but also the size of executive and parliamentary turnover. In fact, a government termination does not always correspond to a significant change in the allocation of portfolios, or in the composition of the coalition. Similarly, elections do not always bring about dramatic changes in the distribution of seats. For instance, Italy prior to 1993 is commonly regarded as a classical case of very volatile politics on the grounds that 52 governments were formed over a period of about 47 years. However, closer inspection of the composition of cabinets and coalitions reveals that each government was on the whole quite similar to the previous one, although some "structural breaks" could be occasionally detected (i.e. the first non-Christian Democrat prime minister in 1982 and the appointment of a socialist prime minister in 1983). Thus, the expectation of parties and ministers in a given executive was one of a very short cabinet duration but also of a very high returnability in office. All in all, volatility might have been not so high as the simple consideration of the frequency of government terminations might lead one to believe. Henceforth, the data-set has been designed to include measures of simple durability as well as indicators of the quantitative and ideological importance of observed changes.

The variable *duration in office* (DUR) is the number of days a cabinet stayed in office. Following the criteria spelled out in Woldendorp et al. (1993 and 1998), office is taken to start when ministers swear-in or the government receives a vote of investiture in the parliament and lasts until a new cabinet is formed. This implies that DUR also includes as duration in office of a cabinet the length of the negotiations over the formation of its successor. Such a choice is motivated by the fact that during the

formation of the new cabinet, the old one usually stays in office (in spite of the formal resignation of the prime minister) with caretaker powers. However, if one were interested in a measure of duration net of the impact of negotiations, the information incorporated in FORM (see Paragraph 1.3.2.e) could be immediately used to correct DUR. Moreover, to account for differences in constitutional arrangements, DUR is divided by the maximum time between two elections to obtain the *survival rate of the government* (SURV). Similarly to what is done for individual cabinets, a variable *legislature duration* (DURLEG) is computed as the spell elapsing between two consecutive elections. DURLEG divided by the maximum constitutional term of office of the legislature gives the *survival rate of the legislature* (VIV).

The indicators to account for the real extent of government/coalition changes are those suggested by Strom (1984) and Huber (1998). The variable *alternation* (ALT) is the share of seats held by parties entering the government, plus the share of seats held by parties leaving the government (Strom, 1984). It therefore is an inverse index of returnability in office. The variable *total portfolios volatility* (TPV) is the total number of changes in portfolios allocation between two consecutive governments. When only partisan changes are considered, then *party portfolios volatility* (PPV) is obtained. If changes are weighted by the Euclidean distance between the two parties (the one leaving the control of the portfolio and the one acquiring it), then an indicator of *ideological portfolios volatility* (IPV) is determined (Huber, 1998).

Finally, the two indicators of the extent of parliamentary changes are *parliamentary volatility* (VOL1) and *electoral volatility* (VOL2). Both have been originally defined by Powell (1982). VOL1 is the sum of the shares of seats added or lost by each party in the present legislature with respect to the previous one, divided by two. VOL2 is defined as VOL1 with the only difference where that shares of votes are used instead of shares of seats. For low values of VOL1 and VOL2, elections (which theoretical models often regard as a kind of "Doomsday") bring about very minor changes in the composition of the political picture. The higher or lower volatility of consensus is likely to affect parties' behaviour in office in terms of both strategic bargaining choices and contribution to policy decision making.

1.3.2.g Institutional arrangements and budgetary procedures

A set of dummy variables is included in the data-set to account for cross-country differences in a variety of institutional arrangements. *Investiture vote* (INV) is coded

one for the countries where a formal investiture vote is required as the final institutional hurdle before the cabinet can formally enter office. *Continuation rule* (CONT) is coded one for those countries where the continuation rule applies. The continuation rule states that the incumbent cabinet may continue in office without having to resign even if elections are held or the incumbent coalition has the right to make the first proposal for the formation of a new cabinet. *Legislative power* (LEG) takes value one in countries where the legislature has the power to dissolve itself and call for new elections. *Government power* (GOV) takes value 1 in countries where the government has the power to dissolve the legislature. *Resignation after no-confidence* (RES) is equal to one for those countries where the government is effectively forced to resign after a no-confidence vote has been cast. *Proportional rule* (PR) is coded one if a purely proportional electoral system is at work in a given country.[9]

Turning to budgetary procedures, three dummies aimed at representing the degree of centralisation of the process are defined based on the discussion in Hallerberg and Von Hagen (1997). *Delegation to Ministry of Finance* (DELEGATION) is equal to one for those countries where fiscal powers are centralised in the hands of a strong Ministry of Finance. *Commitment to negotiated fiscal contracts* (COMMITMENT) takes value one for countries where fiscal policy decisions come from commitments to fiscal targets defined in contracts agreed upon by coalition partners. *Unconstrained procedure* (UNCONSTRAINED) is coded one for countries where fiscal powers are not centralised and there is no commitment to fiscal contracts.[10]

1.4 Some summary statistics and preliminary evidence on cross-country differences.

The western European coalition systems studied in this thesis are: Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway and Sweden. For each of these countries, time series of all the variables mentioned in Subsection 1.3.2 are constructed starting in 1945 (1948 for

[9] Most of the western European coalition system adopt a proportional representation rule. However, whilst in some countries this rule is at work in its pure form, in others it is combined with alternative arrangements for the allocation of a quota of seats. The dummy PR is coded 1 only for the first group of countries.

[10] In fact, several other aspects of the budget formation process might have empirical relevance. In this sense the three dummies above certainly do not offer a complete representation of budgetary institutions and might even appear too simplistic. However, they are sufficient to undertake a systematic empirical test of the theories spelled out in Subsection 4.1.4 of Chapter 4.

Germany and 1946 for Italy) and ending in 1999. The data-set therefore contains information concerning the structure and composition of a total of 402 governments and 206 legislatures. All cabinets, whether single party or coalitions, are included in the empirical analysis. This Section discusses a few basic statistics as a way to provide a preliminary intuition on key features of the political process in the group of countries under investigation.

1.4.1 Parliaments in the western European coalition systems.

Table 1.1 provides information concerning the basic structure and composition of parliaments in the 13 countries of the sample. As a point of comparison, the United Kingdom (a textbook case of *single-party majority system*) is added to the list. The first column gives the total number of legislatures formed throughout the post-war era. The next five columns report the sample period averages of basic indicators of fragmentation, volatility, polarisation and survival in office of the parliament. The last two columns display indicators of the frequency of government terminations. The entry in the column labelled "General Instability" is the sample period average of the annual number of terminations observed between two consecutive elections. The entry in the column labelled "Partisan Instability" is the sample period average of the annual number of changes in the partisan composition of the ruling coalition observed between two consecutive elections.

One of the key features of a coalition system is the relatively large numerical fragmentation of its parliament. Here, numerical fragmentation is captured by the variable FRA, the effective number of parties in the legislature. Notice immediately that, as expected, the average FRA in the UK is lower than in any of the coalition systems. However, there are six coalition systems with an average absolute number of parties in the legislature (ANP) lower than in the UK. This piece of evidence, however, should not be surprising. British legislatures have always been characterised by the presence of two large parties (the Conservatives and the Labour Party) plus several very small parties often controlling no more than one seat (the Social Democrats being the only one able to hold, from time to time, a double-digit number of MPs). In the computation of ANP, all parties count as one, regardless of their size. In the computation of FRA instead, each party is weighed by its size, so that the contribution of several British parties is indeed negligible. As widely argued in the literature (see, Laasko and Taagepeera, 1979 and Powell, 1982), FRA is better suited than ANP to

represent the idea of fragmentation as it is incorporated in political economic theoretical models.

Data on the degree of fragmentation suggest a few other interesting considerations. The largest average absolute number of parties is observed in Italy (12.57). However, with such high value of ANP, a value of FRA of only 3.798 is associated. Given that the full sample average of FRA (UK excluded) is 3.571, it can be argued that the effective degree of numerical fragmentation in Italy is not so high as is often assumed by political commentators. Similarly to the UK, the significant discrepancy between the observed ANP and FRA is due to the presence in the parliament of several small size parties. However, contrary to the British case, in Italy the absence of a party holding the absolute majority of seats implies that these small parties often play an important role in the process of coalition formation and disruption, thus making cabinet turnover considerably higher. So, for example, in the UK the average number of cabinet terminations observed in one year of a legislature is 0.392, whilst in Italy this number is larger than 1.

	Total number of legislatures	*Absolute number of parties* **(ANP)**	*Effective number of parties* **(FRA)**	*Parl. Volatility in %* **(VOL1)**	*Polarisation in %* **(POL)**	*Rate of survival* **(VIV)**	*General Instability*	*Partisan Instability*
Austria	16	3.09	2.483	4.827	5.925	0.775	0.327	0.109
Belgium	17	8.76	5.204	12.33	22.59	0.724	0.727	0.527
Denmark	22	7.95	4.544	11.41	30.06	0.595	0.592	0.349
Finland	15	8	5.035	9.411	20.62	0.891	0.819	0.793
France	16	6.5	3.881	25.61	25.56	0.685	1.136	0.881
Germany	14	5.28	3.224	7.675	3.3	0.876	0.338	0.371
Iceland	16	4.76	3.72	10.04	17.36	0.814	0.269	0.269
Ireland	17	5.18	2.846	8.841	0.641	0.662	0.478	0.395
Italy	14	12.57	3.798	13.05	32.14	0.706	1.138	0.837
Luxembourg	12	5	3.343	10.58	8.858	0.884	0.211	0.155
Netherlands	16	9.3	4.656	10.23	9.794	0.865	0.352	0.415
Norway	14	6.46	3.592	11.55	10.41	0.997	0.211	0.229
Sweden	17	5.6	3.371	8.414	6.54	0.764	0.414	0.182
UK	15	6.53	2.1139	8.78	2.62	0.887	0.392	0.237

Table 1.1 *Some basic attributes of legislatures in western European coalition systems, 1945-1999.*
FRA is the inverse of the squared sum of shares of seats held by all parties in the parliament.
VOL1 is the sum of the shares of seats added or lost by each party between two elections.
POL is the sum of the shares of votes received by parties classified as extremist or anty-system.
VIV is the duration of the legislature divided by the maximum term between two elections established by the Constitution.
See Appendix A1.2 for explanatory notes on Germany and Italy.

The largest degree of fragmentation of the legislature is observed in Belgium, Finland, the Netherlands and Denmark. However, the evolution of the political process in these four countries appears to be quite different. The first three are normally governed by cabinets supported by broad coalitions, controlling more than 50% of seats in the parliament. These coalitions are nevertheless relatively unstable in Belgium and

Finland, as the data on General and Partisan Instability in the last two columns of Table 1.1 show, whilst in the Netherlands cabinet turnover is considerably lower. In Denmark, instead, the typical form of government is a single-party minority cabinet; cabinet terminations are less frequent (especially with respect to Finland), but the rate of survival of the legislature is significantly smaller. As a matter of fact, in Denmark anticipated elections are often called as means of overcoming the political impasse that follows the collapse of a government.

Significant cross-country differences show up in the column of average polarisation (POL). On one extreme there is a country such as Ireland (but also Germany, Austria, Sweden and, outside the group of coalition systems, the UK) where polarisation is almost zero. On the other extreme, there are countries like Italy and Denmark where just less than one third of electoral votes are cast to parties classified as having an anti-system or extremist ideological orientation. A feature in common to most of the systems where polarisation is high is that two phases can be identified in the distribution of consensus. In the first phase (which lasted from the end of World War II until the end of '70s, mid '80s, depending on the country), quite a consistent share of the electorate supports extreme-left positions, so that polarisation essentially arises from the popularity of national Communist parties and/or related leftist groups. In the second phase (from the end of the'70s, early '80s, throughout the '90s), several previously extremist left wing parties re-locate to the centre of the political spectrum (thus abandoning their anty-system orientation) and the share of consensus received by those that do not re-locate significantly decreases. The bulk of polarisation in this second phase is represented by the electoral strength of extreme-right parties and/or parties oriented towards a division of existing states to grant independence and autonomy to specific regions or language minorities.

The above pattern is evident, for instance, in Italy. The share of votes of the Italian Communist Party (the PCI, historically the largest communist party of non-communist Europe) steadily increases since 1946 until 1976, when it reaches the considerable size of 34.4%, with a share of seats in the legislature of 36%. Over that period of 30 years, polarisation grows from 23.3% up to 44.4%. During the'80s the support of PCI decreases and in 1987 it is at 26.6%. Between 1990 and 1991 the party splits into two different entities: the Democratic Party of the Left (PDS) and Communist Refoundation (RC). The former shifts to the centre of the ideological space, attracting a consensus that oscillates around 21% (with a negative peak of 16.1% in 1992). The latter remains closer to the original communist orientation of the PCI (perhaps even more left-

oriented), with a support of about 8%, until a further split reduces its estimated share of votes to 5-6%. The re-location towards the centre of the PDS implies that the only significant contribution to POL from left-wing parties is the one coming from Communist Refoundation. In spite of this, average polarisation throughout the late '80s and the '90s still remains above 20% (36.9 in 1987, 21.6% in 1992, 15.6% in 1994 and 22.4% in 1996). This is mainly thanks to the increased share of support for the independentist movement Northern League and the extreme-right Italian Social Movement-National Alliance. The Northern League essentially demands the independence of the northern regions of the country from the Centre and the South. Its share of votes is only 0.5% in 1987, but it jumps to 8.7% in 1992. In 1994 Northern League's consensus is stable at 8.4%, but in 1996 it rises again to 10.1%, so that slightly less than half of polarisation in Italy in mid '90s can be traced back to the popularity of this party. The Italian Social Movement is, at least until 1992, a neo-fascist oriented party capable of maintaining its share of consensus around 6% throughout the '80s. In 1993, the party changes its name into National Alliance and adopts a more moderate, although still clearly right-oriented, policy platform. As for the PDS, the shift to the centre suggests that the share of votes of National Alliance (systematically above 10%) must not be taken into consideration for the computation of POL. However, a few hard-nosed leaders of the Social Movement decide not to take part into the new National Alliance and form a new extreme-right party (The Flame), whose support at the 1996 elections is just above 1%. Finally, also associated with the rise of the Northern League is the appearance of a variety of other minor independentist parties (i.e. Venetian League, Lombard Alpine League, Southern Action League, Union Valdotaine), all able to attract local voters for a total of about 3% throughout the late '80s and early '90s. Although the electoral rule has granted them a seat in the parliament in only a few cases, their support still concurs to keep polarisation high in spite of the reduced contribution from the extreme-left.

The French experience is somewhat similar to the Italian case. The share of votes of the Communist Party (PCF) has remained well above 20% for almost thirty years after the war. During the same period, polarisation is observed at around 25%, with no significant contribution from rightist parties. During the '80s, the popularity of the PCF decreases (it is only 2.7% in 1988, before returning to about 10% in the '90s), whilst some other smaller extreme-left parties completely disappear (i.e. Workers' Struggle). On the other hand, there is a strong increase in the consensus received by the extreme-right National Front: its share of votes is 9.8% in 1986 and 1988, 12.7% in 1993 and

14.9% in 1997. Although the electoral rule in France is such that the party remains with almost no representative in the National Assembly, its considerable consensus adds to polarisation, thus compensating for the smaller contribution of the extreme-left. Moreover, since 1973, a significant shift towards the right of the policy space is undertaken by the Conservatives, whose share thus goes to further increase POL. Overall, POL in France is at its maximum in 1993 (30.4%) when more than half of it is due to support for extreme-right formations.

In Belgium, polarisation is a phenomenon that can be essentially associated with ethnolinguistic fractionalisation. With the exception of a peak in the first elections after the war, the Belgian Communist Party (KBP) has never been able to attract much consensus. Polarisation has thus remained low until the end of the '50s (it was 3.9% in 1958). Then, the appearance of the first language parties (such as Flemish Christian People's Party, Francophone Democratic Front, Wallon Rally) between the second half of the '50s and the first half of the'60s determines an inversion of the trend. Polarisation grows to 19.1% in 1968 and then to 26.6% in 1971, when the split of the Liberal Party gives birth to a Francophone Liberal Party. Between 1977 and 1978 the Belgian Socialist Party (that at 1977 elections received 27% of total votes) splits and a Flemish component is formed (Flemish Socialist Party) that adds a further 12% (it will grow to 15% in 1987) to polarisation. POL thus achieves its maximum in 1981 (42.1%), before stabilising at around 38% throughout the last period of fifteen years. During the '90s, a slight loss of support suffered by ethnolinguistic parties in aggregate is compensated, as far as polarisation is concerned, by the consensus obtained by the extreme-right Flemish Block (from 1.9% in 1987 to 7.8% in 1995) and National Front (1.1% in 1991 and 2.3% in 1995).

In Finland, polarisation is fairly stable above 20% until mid '80s. For the first two decades right after the end of World War II, the only significant contribution comes from the extreme-left Finnish People's Democratic Union (SKDL), that includes the Finnish Communist Party. At the general elections in 1970, the share of votes of SKDL drops from 21.2% to 16.6%. At the same time, the Finnish Rural Party (FRP) increases its support from the 1% scored in 1966 to 10.5%. Although various empirical policy scales locate the FRP at the centre-left of the ideological continuum and not at the extreme, Powell (1982) explicitly adds its share to the computation of POL, which therefore rises to 27.1% in spite of the loss suffered by the SKDL. Throughout the '70s and the first half of the '80s the bulk of polarisation continues to be represented by the shares of the SKDL and the FRP. Following the slight decrease in the consensus of

these two parties, POL reduces to 26.2% in 1972, 24.2% in 1975, 22.8% in 1979, 23.8% in 1983 (when the SKDL is at 14% and the FRP at 9.7%). In 1987 polarisation drops to 15.7%, with the consensus of SKDL reduced by about 5 percentage points and the one of the FRP more than halved. Between the end of the '80s and the early '90s a new political formation is formed that replaces the SKDL. However, this left-wing alliance (VAS) is classified by country experts as more ideologically moderate than the SKDL and its share is therefore not included in POL. Without the contribution from VAS, polarisation in the '90s oscillates around 6% to 7%, mostly reflecting the consensus received by the FRP, the Christian League (whose orientation has become more extreme-right since the late '80s) and the newly formed Progressive Finish Party (radical free-market ideology).

The last country with an average polarisation above 20% (the full-sample average is 18.191 %) is Denmark. Here, an interesting pattern is observed. The cycle of consensus is similar for both extreme-left and extreme-right parties. This implies a synchronised cycle of polarisation and an almost equal contribution from the two extremisms at any point in time. After the end of the war, significant contributions to POL come from the extreme-left Danish Communist Party (DKP) and the extreme-right Conservative's People Party. By the late '50s the consensus of the former has almost disappeared, but its place has been taken by the Socialist Party (SF), whose ideological position seems to be more left-oriented than most other socialist parties in Europe. Polarisation thus grows to about 30% in the '60s as a consequence of both rightist and leftist extremism. In the '70s, the newly formed extreme-right Progress Party attracts a considerable share of consensus, thus determining a further increase in POL , which is at 38.7% in 1981 and gets to its maximum in 1984 (42.7%). In the second half of the '80s and throughout the '90s the consensus of the Conservatives, the SF and the Progress Party significantly decreases, leaving the country with polarisation at 28.9% in 1998.

Finally, two last pieces of preliminary evidence are worth mentioning. First, the average rate of survival of the legislature (VIV) is smaller than one in almost all countries. This means that anticipated elections are not uncommon in all the countries in the sample; however, they tend to be more frequent in Denmark, France and Italy. A clear exception is represented by Norway, where a fixed four-year term of office for the parliament is explicitly fixed by the Constitution, so that early elections can never be called. Second, the full sample average parliamentary volatility (VOL1) is about 11%. France appears to be an outlier in the sample, with an average VOL1 of more than 25%. This high volatility of the distribution of seats in the parliament might be due to the

volatility of the preferences of the French electorate. However, the average electoral volatility (computed by comparing the shares of votes received by parties in two consecutive elections) is in France only 15.12% and not much greater than the electoral volatility observed in other countries (10.45% in Iceland, 13.02% in Italy, 13.1 in Belgium). The excess of VOL1 in France might well be a consequence of its electoral rule. Whilst in the other countries, a proportional system (either in its pure version, or combined with various alternative arrangements for the allocation of a quota of seats) is at work, France adopts a plurality system which brings about some significant discrepancies between changes in the distribution of votes and corresponding changes in the distribution of seats. So, for example, at the general elections in 1958, a 22.8% electoral volatility produces a 50.5% parliamentary volatility. Similarly, in 1968, electoral volatility is 9.56%, but the associated parliamentary volatility is 26.8%; in 1993 electoral volatility is 17.75% and parliamentary volatility is 40.1%; in 1997 the discrepancy between the two figures is at its maximum: 30.2 percentage points (12.4% against 42.6%).

1.4.2 Governments in western European coalition systems

Besides the relatively large fragmentation of their legislatures, the key attribute of coalition systems is that their executive is normally characterised as a coalition government or a single-party minority government. Table 1.2 reports for each country in the sample plus the UK the following information: (i) the total number of cabinets formed throughout the post war era, (ii) the total number of single-party majority governments (ii) the number of cabinets that were supported by coalitions, (iii) the number of coalitions including exactly two parties, (iv) the number of coalitions including exactly three parties, (v) the number of coalitions including exactly four parties, (v) the number of coalitions including exactly five parties or more, (vi) the proportion of total post-war time the country has been governed by coalition cabinets.

The difference between the coalition systems and the typical single-party majority system (UK) is now even more striking than in Table 1.1. In the UK all governments but one are supported by just one party that controls at least 50% of seats in the House of Commons. The only exception is represented by a Labour cabinet formed in March 1974 and which only lasted seven months, as a bridge between two general elections. In coalition systems instead, single party majority governments are the exception,

representing only 23 cases out of 400 and existing in only five countries. Within the group of coalition systems, 10 out of 13 have been governed by coalition governments for more than half of total post-war time. In two of the other three (Norway and Sweden) single-party minority is the most common form of government. In the third (Ireland), the most frequently observed situation is the one of coalition cabinets (10 cases out of 21 and 49.1% of total post-war time), although a period of about 16 years between 1957 and 1981 can be identified during which single-party majority cabinets supported by the Fianna Fail have been in office. However, ever since the 1981 elections, the Fianna Fail has lost the absolute majority in the parliament so that the only alternative to coalitions has been a single-party minority government (effectively formed in 1982 for a period of about ten months and again in 1987 for more than two years).

	cabinets	*single-party majority*	*coalitions*	*2 parties*	*3 parties*	*4 parties*	*5 or more parties*	*frequency of coalitions (% of total time)*
Austria	21	4	16	15	1	0	0	67.3
Belgium	37	3	33	11	3	11	8	92.1
Denmark	30	0	16	6	9	1	0	59.5
Finland	41	0	37	3	9	18	7	82.7
France	57	0	55	14	13	21	7	100
Germany	27	0	26	10	13	0	0	99.9
Iceland	22	0	20	9	10	1	0	99.1
Ireland	21	7[a]	10	7	2	4	0	49.1
Italy	56	1	40	4	12	14	10	90.4
Luxembourg	17	0	17	16	0	1	0	100
Netherlands	21	0	21	7	4	8	2	100
Norway	25	6	8	0	5	3	0	23.7
Sweden	25	3[b]	7	4	2	1	0	27.5
UK	20	19	0	0	0	0	0	0

Table 1.2: *Governments in western European coalition systems, 1945-1999.*
[a] In two cases the party holds exactly 50% of seats.
[b] In one case the party holds exactly 50% of seats.
See Appendix A1.2 for further explanatory notes concerning Denmark, Finland, Germany and Italy.

Turning to the structure of coalitions, in the most common case two parties are involved (106 cases). The frequency of three-party and four-party coalitions is almost identical (83 and 84 cases respectively), whilst five-party coalitions (35 cases) are mostly observed in Belgium, Finland, France and Italy. Interestingly, these four are the countries for which the total number of coalitions with four parties or more is larger than the total number of coalitions with less than four parties. They also happen to be the countries with the highest average general instability and with above average polarisation and fragmentation of the legislature (see Table 1.1). This provides a first intuition on the existence of a link between cabinet stability, structure of the supporting coalition and basic features of the legislature. A systematic econometric analysis of such a potential link is undertaken in Chapter 3.

In Table 1.3 more details on basic features of governments in coalition systems are given. The average values of the following selected indicators are reported: effective number of parties in the coalition (ENP), degree of ideological heterogeneity of coalition partners (CI), duration and rate of survival of the cabinet (DUR and SUR), total share of seats controlled by the ruling coalition (SH), ideological location of the coalition on the Left-Right continuum (LOC). All these indicators have been intuitively discussed in previous Subsection 1.3.2. In addition to this, the last column of the Table gives the number of left-wing (L), right-wing (R) and centrist (C) governments.

	effective number of parties **(ENP)**	*Conflict of interest* **(CI)**	*Cabinet Duration in days* **(DUR)**	*Survival rate* **(SUR)**	*Share of seats in %* **(SH)**	*Ideological location* **(LOC)**	*Frequency*		
							L	C	R
Austria	1.668	1.657	917.2	0.571	75.23	4.909	6	15	1
Belgium	2.67	1.349	529.4	0.363	61.86	5.463	4	28	3
Denmark	1.501	0.315	640.8	0.439	40.58	4.922	19	4	7
Finland	2.625	1.108	404.3	0.277	55.47	5.058	14	27	3
France	2.422	1.028	330.1	0.181	62.61	5.61	18	19	20
Germany	1.844	0.452	688.8	0.472	57.1	5.42	8	14	5
Iceland	2.164	1.639	879.8	0.603	59.52	5.674	3	15	4
Ireland	1.318	1.029	899.6	0.493	50.81	5.973	0	14	7
Italy	1.596	0.377	336.8	0.181	53.1	5.061	12	41	1
Luxembourg	1.972	1.07	1136	0.622	70.58	4.713	5	12	0
Netherlands	2.573	0.889	901.6	0.618	61.94	5.527	2	16	3
Norway	1.549	0.174	774.5	0.53	45.89	4.73	17	5	4
Sweden	1.31	0.15	752.2	0.515	46.9	4.293	20	2	3
UK	1	0	1031	0.5801	54.6	5.814	11	0	9

Table 1.3 *Selected basic attributes of governments and coalitions in western European coalition systems, 1945-1999.*
ENP is the inverse of the squared sum of shares of coalition seats held by each party.
CI is the dispersion of coalition partners' location on the ideological continuum.
DUR is the time between formal investiture of the incumbent and formal investiture of the successor.
SUR is DUR divided by the total maximum time between two elections.
LOC is the weighted average of coalition partners' location. Shares of coalition seats are used as weights.
See Appendix A1.1 for details on the construction of the policy scales from which LOC is obtained.

A striking piece of evidence concerns the relationship between survival in office and fragmentation (numerical and ideological) of the ruling coalition. Of the three countries with highest average survival (Iceland, Luxembourg and the Netherlands), two (Iceland and the Netherlands) display an effective number of parties in the coalition and a degree of conflict of interest above the full-sample mean (which is equal to 1.996 for ENP and 0.838 for CI). The average conflict of interest is also higher than the full-sample mean in the third country (Luxembourg). Moreover, notice that in Italy, where duration in office is extremely low, both CI and ENP are below the full-sample average. On the other hand, Belgium, Finland and France (the other three countries with the lowest survival rates), all experience higher than average numerical and ideological fragmentation of coalitions. Thus, the simple statistics in the Table seem to suggest that

although it might to some extent contribute to overall cabinet stability, the fragmentation of the coalitions alone cannot completely explain duration in office.

An analogous conclusion can be reached for the share of seats controlled by the coalition. As a matter of fact, the whole sample of coalition systems could be divided into three groups according to the average parliamentary size of the coalition. The first group includes those countries where governments are normally supported by large surplus majority coalitions controlling more than 60% of total votes in the legislature. The second group includes countries where coalitions can be generally characterised as "bare majority", controlling more than the 50% threshold of seats, but less than 60%. The third group consists of countries where the average coalition is smaller than 50%. In the first group there are Austria, Belgium, France, Luxembourg and the Netherlands. Two of these five are in fact low stability countries (Belgium and France). However, the other three are characterised by fairly stable governments. The second group includes Finland, Germany, Iceland, Ireland and Italy. Iceland is unambiguously a high stability country (and its average SH is indeed very close to the 60% threshold), but Finland and Italy are certainly low stability ones, whilst Germany and Ireland both have an average duration in office close to the full-sample mean. Finally, in the third group there are the three Scandinavian countries where minority governments represent the norm. In all of these three countries, the average survival in office is higher than in several countries included in the first and the second group; that is, countries with larger coalitions. So, it would seem that although important for resisting legislative challenges in a parliamentary democracy, the share of seats controlled by the coalition is not a necessary condition for cabinet stability. That is, stability can be ensured, at least to some extent, even in its absence and, at the same time, its occurrence does not alone guarantee long-lasting cabinets.

As the theoretical models briefly discussed in Subsection 1.3.1 point out, cabinet stability is the result of a complex process to which many factors are expected to contribute. It is therefore not surprising that the evidence concerning the relationship between duration in office and fragmentation on the one hand and duration in office and size of the coalition on the other hand is somewhat mixed. Moreover, it has to be taken into account that fragmentation and size of the coalition are likely to be correlated: in the absence of a party controlling the absolute majority of seats (as it is often the case in the western European coalition systems), a large support in the parliament can be achieved only by aggregating several parties of intermediate size and, possibly, diverse ideological orientation. Consider, for instance, that in all the countries in the group

characterised by a share of seats of the coalition larger than 60% , the average degree of intra-coalition ideological heterogeneity is above the full-sample mean. In this sense, the process of aggregation has both costs and benefits in terms of the ability of the cabinet to last in office. More aggregation results in a larger supporting coalition and hence prevents the government from the need to find external support to survive legislative challenges. But at the same time, given the structure of the legislature in a typical coalition system, it implies that a larger number of actors with divergent policy views are brought together, thus raising the potential for internal conflicts and generally making any intra-coalition agreement more difficult. Then, it could be argued that long-lasting coalitions and cabinets are those capable of finding an equilibrium between these two conflicting forces. The point is that the characterisation of this equilibrium (i.e. how much aggregation is optimal) is likely to depend upon a variety of other factors, such as the political and economic environment, the volatility of the electorate, the distribution of policy preferences in the parliament, the existence of alternative viable coalitions and so on. The estimation of a statistical model of cabinet duration in Chapter 3 will shed additional light on these issues.

The variable ideological location (LOC) in Table 1.3 is computed as the weighted average of coalition partners' position on a uni-dimensional Left-Right continuum that runs from 1 to 10. These positions are obtained from the analysis of the policy proposals stated in parties' manifestos (see Appendix A1.1 for details). In Chapter 4, different versions of the variable LOC are discussed, each obtained from different system of weights. The specific version considered here is the one based on the assumption that the effective contribution of any partner to the process of policy making reflects this party's parliamentary size. Therefore, parties' shares of coalition seats are used as weights.[11] To interpret the data reported in the table, consider that the median value 5.5 could be taken as a threshold to separate Left from Right. That is, when LOC is smaller than 5.5, then the coalition can be regarded as left-wing; when LOC is larger than 5.5, then the coalition can be regarded as right-wing. The frequencies reported in the last column of the table instead are obtained by considering a tri-partition of the policy space in Right, Centre and Left. A cabinet is classified as "Left" when the

[11] As will be discussed in Chapter 4, this system of weights can be associated with a form of government that political scientists call *party government* (see for instance Laver and Shepsle, 1994). It is also worth stressing that this same system of weights is the most widely used in the literature (see, for instance, Alesina, Perotti and Tavares, 1998).

corresponding value of LOC is smaller than the threshold value 4.6, as "Centre" when LOC is included between 4.6 and 6.4 and as "Right" when LOC is larger than 6.4.

Before commenting on the ideology data, a cautionary note on the interpretation of the values in the column labelled as LOC has to be made. As sample period averages, they tend to smooth location towards the centre of the ideological continuum. The UK, although it is not a coalition system, is a clear example of this smoothing effect. There, left-wing cabinets supported by the Labour Party (located at around 4 on the ten points Left-Right scale) alternate in power with cabinets supported by the Conservative Party (located at around 8); no centrist government (i.e. one with a location included between 4.6 and 6.4) is ever observed. However, when computing an average value for the 22 cabinets of post-war British History, one obtains 5.8; that is, the location of a centrist government never, in fact, formed. In principle, the same problem arises for those countries where the frequency of centrist cabinets is low. In practice, none of the coalition systems it is likely to be as strong as it is for the British case, since only in the UK does one observe an almost balanced alternation of left and right with the complete absence of the centre. What is observed in some coalition systems (such as Denmark, Norway and Sweden) is a dominance of the left, with a relatively low frequency of right and centre cabinets. In these cases, the average LOC takes values that, although relatively moderate, still reflects the clear left-wing character of the sequence of ideologies.

In general, the data in Table 1.3 suggest that coalition systems have been governed mostly by centre-left cabinets. In nine countries, the frequency of centrist governments is higher than the frequency of other governments (whether left-wing or right-wing). Of the remaining four countries (Denmark, France, Norway and Sweden), one (France) displays an overall balance of frequencies, the other three being characterised by an absolute majority of left oriented governments. These are the three countries where large Social Democratic parties tend to form single-party (often minority) governments, occasionally replaced in office by cabinets supported by large and fragmented coalitions built around moderate and conservative parties (the Moderate Unity Party in Sweden, the Conservatives in Norway, the Conservatives again and the Liberals in Denmark).

Within the group of countries with a high frequency of centrist cabinets, at least three peculiar situations can be identified. In Austria, a strong centrist party is missing for much of the sample period, but 15 out of the 22 post-war cabinets are characterised by a location included between 4.6 and 6.4. This is because the most viable coalitions in that country appear to be those formed by two large non-centrist parties: the Socialist

party, located at the left of the policy space, and the Austrian People's Party, located at the right. Being of almost equal size, these two parties give rise to moderate governments. Thus, a possible explanation for the persistent absence of a strong centrist party would be that the demand for moderation typically expressed by middle-of-the-road voters is already met by coalitions of non-centrist parties.[12]

In Ireland, contrary to what happens in most other countries where Left is the second highest frequency, the alternation is between centre and right-wing governments. This is basically a consequence of the structure of the party space and of the strategic choices of the pivotal party, the Fianna Fail. Between the second half of the '40s and the late '80s the Irish parliament is essentially composed by three parties. The Fianna Fail is the largest one, controlling the relative (and sometimes absolute) majority of seats and holding a generally centrist position on the ideological continuum. The Fianna Gael is second in parliamentary size and located to the right of the Fianna Fail. The Irish Labour Party is the smallest of the three (although still holding a share of seats that oscillates between 5% and 15%) and its orientation can be classified as moderate-left. Moving from its strong bargaining position, the Fianna Fail refuses, at least until 1989, to share office with any other party. This implies that either a single-party government supported by the Fianna Fail or a coalition government supported by the Fianna Gael and the Irish Labour Party can be formed. The relative parliamentary weight of these latter two parties is such that the resulting cabinet would be classified as right-oriented, in spite of the fact that one of its components is moderate-left. As a matter of fact, Fianna Fail single-party governments and Fianna Gael-Irish Labour Party coalitions alternate in power until 1989, giving rise to the observed alternation of rightist and centrist governments. In 1989, the Fianna Fail modifies its strategic behaviour and forms a coalition with the Progressive Democrats, a newly formed right-oriented political formation. However, the weight of the Fianna Fail in the coalition is still dominant, so that the government remains located at the centre of the Left-Right space. A significant shift in the LOC of the government (from 6 to 5.2 on the ten points scale) occurs in 1993, when, following the general elections of late 1992, the Fianna Fail-Progressive Democrats coalition is replaced by a Fianna Fail-Irish Labour Party coalition. The weight of the Irish Labour Party is indeed relatively large (it controls just

[12] This explanation of the lack of a centrist party would be in line with the theory of balance proposed by Alesina and Rosenthal (1995) for the case of the USA. They argue that by splitting their vote between presidential and congressional elections, middle-of-the-road-voters generate *divided governments* with overall moderate policy views.

a bit less than 20% in the parliament), but its overall moderate left orientation (country experts locate it at 4.1; see Huber and Inglehart, 1995) and the still larger share of seats held by the Fianna Fail (41%) prevent LOC from falling below the 4.6 threshold. In 1994 a new coalition is formed by the Fianna Gael, the Irish Labour Party and the small Social Democratic Left Party. Differently from previous Fianna Gael-Irish Labour coalitions, this one is associated with a centrist government, as a consequence of the reduced gap in the parliamentary size between the two parties. Finally, in 1997 Fianna Fail and Progressive Democrats return to office and produce a government again located at around 6 in the policy space.

In France, significant differences in the pattern of LOC arise between the IV and the V Republic. Between 1945 and 1958, 28 cabinets are formed, 19 of which can be calssifed as centrist, the others being left-oriented. Ideologically right-oriented parties (the Conservatives and the Poujadists), although occasionally entering the ruling coalition, are not of a sufficiently large size to determine a shift to the right in cabinet's orientation. From 1959 onward, LOC never takes values in the centrist range [4.6, 6.4] and the ideological sequence resembles the one typical of the UK, with sudden shifts from left to right and vice-versa. Two related factors contribute to the change of pattern at the end of the '50s. First, numerically important parties, such as the Gaullists (later, Rally for the Republic) previously classified as centrist, with the creation of the new Republic decide to relocate towards the right of the policy space (see Dodd, 1976). Second, centrist parties that do not relocate (such as the Radicals) progressively loose consensus as a consequence of the introduction of a new electoral rule. In the end, the V Republic is characterised by 20 right-wing coalition governments mostly supported by the Rally for the Republic and (since its formation in 1978) the Union for French Democracy and 8 left-wing governments supported by coalitions essentially built around the Socialist Party and the Left Radicals (sometimes with the inclusion of the Communist Party).

1.5 Summary and conclusions

The construction of a data-set for the econometric analysis of political-economic issues involves a basic methodological stance. On the one hand, it would be desirable to design empirical measures that closely reflect the abstract concepts incorporated by theoretical models. On the other hand, the limited availability of raw data and the non observability of several phenomena might require some concessions to practical

convenience in the definition of theory-based indicators. The approach I adopt is to investigate the theory aimed at identifying the basic dimensions of the political process that need empirical representation and then define a set of variables able to capture different aspects of these dimensions. A brief overview of the main theories of cabinet formation, cabinet duration and fiscal policy formation (the three issues at stake here) has then been proposed, and seven key political and institutional dimensions identified. Variables in the data-set are grouped according to the specific dimension they ought to represent. A description of each category, together with an intuitive definition of the variables, has been given. More details on the computational procedures and links to the theories are given in the chapters to follow, where more formal models are also discussed.

As an overview of the contents of the data-set, some basic summary statistics have been proposed, mostly sample period averages for a few selected indicators reflecting basic attributes of parliaments and governments. In spite of the preliminary character of the analysis, some interesting aspects of real world politics in coalition system have been emphasised.

First, data on polarisation seem to suggest that countries in the sample experience a common pattern of support for extremist parties. The first legislatures after the end of World War II are characterised by a rather strong consensus for the Communist and other extreme-left parties. In more recent times this consensus has decreased and/or some previously extremist parties have relocated towards the centre. At the same time the positions of extreme-right parties as well as those of political formations proposing the reform of existing states to grant more independence to specific regions and/or language minorities have become more popular.

Second, it is quite clear that both the fragmentation of the coalition and its parliamentary size are not alone capable of fully explaining government duration. For example, in a country like Italy, coalitions tend to be ideologically homogeneous and composed of a relatively low effective number of parties. Furthermore, they usually aggregate more than 50% of legislative votes. In spite of this, Italy is one of the countries where turnover in office is highest. Theoretical models of cabinet duration emphasise other factors that might be of importance in determining the survival rate. Systematic evidence on these issues is given in Chapter 3.

Third, the countries in the sample have been mostly governed by centrist and left-wing governments since 1945, at least to the extent that the ideological location of a government can be computed as the weighted average of the locations of the parties that

support it, using the shares of coalition seats as weights. The only exception to this common pattern is represented by Ireland, where the specific composition of the party space and the strategic choices of the pivotal party generate an alternating sequence of centrist and right-wing cabinets.

To conclude, a final word on the economic data. Politico-economic models combine the representation of the political process with some relevant aspects of the economy. It is therefore obvious that the econometric analysis will made use of economic indicators, besides the political ones. As basic sources of economic data, I refer to commonly available data-sets: the Statistical Compendium of the OECD (various issues) and the International Financial Statistics and International Government Statistics of the IMF (various issues). Further details are given in the Appendices to each chapter.

Appendix A1.1. Two technical issues: the construction of Left-Right ideological scales and the frequency of observations in the data-set.

A1.1.a Empirical Left-Right ideological scales: sources and methods

Let the policy space S consist of a set of n dimensions, each referring to a specific area of interest (i.e. finance, foreign affairs, home affairs, etc.). The number n of dimensions composing the policy space might change over time and across countries. Normalise the range of policy choices on the generic dimension j to an interval that runs from, say, 0 to 1. Then, the policy preferences (ideal policy) of the generic party i on the generic dimension j of the policy space S ($j \in S$) can be represented by a parameter θ_{ij} such that $0 \leq \theta_{ij} \leq 1$.The parameter θ_{ij} is often referred to as the "location" of party i on the dimension j. The closer the location θ_{ij} is to 0, the more left-wing the orientation of party i with respect to the policy issues pertaining to the dimension j is. The overall ideology of party i can be defined as the set of n policy preferences θ_{ij} .

By looking at the policy proposals stated in the electoral manifestos, country experts are able to generate uni-dimensional empirical representations of parties' ideology. On these Left-Right scales, any party i is assigned a cardinal location that summarises the set of its policy preferences θ_{ij} as they appear from the official documents released to the press and voters (the manifestos) and determined by party's members in regularly held meetings and conventions. An example of one of such scale is given in Figure A1.1 for the case of the Italian party system in the early '90s. Notice that the scale is defined over an interval that runs from 1 to 10, with 1 representing extreme-left.

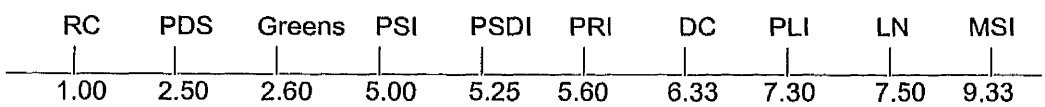

Figure A1.1 *Ideological location of political parties in Italy in the early '90s* (Huber and Inglehart, 1995). Parties are: Comunist Refoundation (RC), Democratic Party of the Left (PDS), Greens, Socialist Party (PSI), Social Democratic Party (PSDI), Republican Party (PRI), Christian Democracy (DC), Liberal Party (PLI), Northern League (LN), Social Movement (MSI).

Thus, Left-Right policy scales provide information on the overall ideology of political parties based on country experts' analysis of party manifestos. It might be argued that the aggregation of different policy positions on a uni-dimensional scale is an oversimplification. However, both theoretical and empirical arguments can be made that

suggest that this is not the case. In the theory, the problem of identifying stable solutions to the legislative bargaining problem has often led scholars to explicitly assume a uni-dimensional policy space. Thus, the predictions obtained from these models could be tested only by mean of uni-dimensional scales. Empirically, two stylised facts are observed in western European coalition systems (see Laver and Hunt, 1992, Browne and Dreijmanis, 1994; Laver and Shepsle, 1994 and Huber and Inglehart, 1995). First, party locations on different dimensions are positively correlated; henceforth a party that tends to be "liberal" on some issues is unlikely to be very "conservative" on others. Second, the basic issues that separate Left from Right can essentially be traced back to a unique dimension: the economic one. It then follows that by looking at the contents of economic policy proposals, country experts obtain most of the information they need for the completion of ideological scales.

Scales such as the one presented in Figure A1.1 have been used in the construction of the data-set for this thesis. In order to guarantee the comparability of locations in time and space, four studies have been selected among the many available in the literature. Each of these four studies reports scales for all the thirteen countries in the sample (with some exceptions for Iceland and Luxembourg, for which additional sources had to be used). This in turn ensures comparability in space: the criteria used to evaluate the contents of policy manifestos are the same for all countries and hence the ideology corresponding to some given location x is the same in all countries.

The issue of comparability in time is more subtle. Parties sometimes re-locate over time. For example, they tend to move from extremist positions to the centre in order to attract the support of moderate voters or, alternatively, they could decide to shift away from the centre towards more radical locations in order to better differentiate their identity and message. As a consequence of this relocation, it is possible that a unique scale, produced at some given point in time, cannot correctly reflect the position of all parties in all countries throughout the whole of the sample period 1945-1999. Henceforth, scales generated at different times must be considered. Then, the point is to be sure that these different scales are comparable, so that each of them assigns the same ideological meaning to any given location x. The strategy I have adopted to ensure this comparability is as follows. For each country, a group of parties for which the literature reports no significant re-location over a sufficiently long period is identified. Then, of all the available scales produced at different points in time and covering that period (or part of it), the comparable ones are those that effectively report the same cardinal location for all non-relocating parties (if a party does not relocate, scales produced at

different times must report the same location otherwise it means that they attach a different ideological orientation to the same cardinal location). The four studies selected display this important feature and hence the issue of time comparability of the sources should not represent a problem.[13]

The four scales I have referred to are: Dodd (1976), Browne et al. (1984), Castle and Mair (1984), Huber and Inglehart (1995). Additional sources have been taken from Laver and Schofield (1990, Appendix B). All scales are converted to an interval that runs from 1 to 10. Given the time horizon explicitly stated by the authors, the first two are used for the period between the second half of the '40s and the first half of the '70s, the third one is used for the period between the second half of the '70s and the first half of the '80s, the fourth one for the late '80s and the '90s. The specific point in time at which the shift from one scale to another occurs is set for each country so as to coincide with the beginning of an electoral campaign (i.e. the electoral year or the pre-electoral year). It then follows that changes in location are modelled as sudden movements rather than as gradual adjustments that take place over a considerable length of time. In fact, an important decision such as the one of modifying public policy positions usually takes time to be made. However, once the process is completed (i.e. a sufficiently large consensus is formed among party delegates to support the new policy views), its outcome (the new location) is incorporated into a new electoral manifesto and represents a break relative to the manifesto of the previous campaign. Thus, modelling relocations as structural breaks is consistent with the approach of taking electoral manifestos as the formal statements of a party's ideology.

A1.1.b The frequency of observations.

Consider a sequence of cabinets in a given country and take for each of them one observation on each of the indicators described in Subsection 1.3.2. This approach produces time-series with the key feature that a new observation is recorded any time that a new cabinet is formed. That is, the frequency of the data corresponds to the frequency of cabinet turnover. Clearly, since cabinets have different durations in office, observations are taken at non-regular intervals. This organisation of data on a *cabinet basis* is required for the econometric analysis of Chapters 2 and 3. For the analysis of

[13] Notice that this strategy does not require the existence of parties that never re-locate (examples of such parties would be indeed very difficult to find), but only of parties that do not re-locate for a sufficiently long period (normally two legislatures).

Chapter 4, instead, data should be arranged on a more traditional *annual basis*; that is, for each country, one observation on any of the indicators should be taken every year. Then the question is what to do when two or more cabinets are observed in office during the same year.

To pinpoint this idea, consider the following example. The sequence of cabinets observed in Italy during the 1987-1992 legislature is summarised in Table A1.1. For each cabinet, the effective number of parties in the coalition (ENP), the total portfolios volatility (TPV), the conflict of interest (CI) and the degree of polarisation of the legislature (POL) are also given.

Cabinet/coalition	*Date of formation*	*effective number of parties* **(ENP)**	*conflict of interest* **(CI)**	*total portfolios volatility* **(TPV)**	*polarisation* **(POL)**
Goria I (DC-PSI-PRI-PLI-PSDI)	29/07/1987[a]	2.232	0.767	29	36.9%
De Mita I (DC-PSI-PRI-PLI-PSDI)	13/04/1988	2.232	0.767	17	36.9%
Andreotti VI (DC-PSI-PRI-PLI-PSDI)	23/07/1989	2.232	0.767	22	36.9%
Andreotti VII (DC-PSI-PLI-PSDI)	15/04/1991[b]	1.98	0.573	16	36.9%

Table A1.1 *Italian governments between July 1987 and April 1992.*
Parties are: Christian Democracy (DC), Socialist Party (PSI), Republican Party (PRI), Social Democratic Party (PSDI), Liberal Party (PLI).
[a] first cabinet of the new legislature formed with the 1987 general elections.
[b] formal termination is in June 1992, when the new Amato I cabinet is formed following the 1992 general elections.

Notice immediately that in Table A1.1 data are organised on a *cabinet-basis*: each entry in the table corresponds to a specific individual cabinet. Polarisation is a measure related to the legislature and hence it is constant across all the cabinets formed during the same legislature. Moreover, the composition of the coalition is the same for the first three cabinets, so that both ENP and CI are equal for Goria I, De Mita I and Andreotti VI. In 1991, the decision of the PRI to go to the opposition determines a reduction in both the effective number of parties and the degree of intra-coalition heterogeneity. The entries in the column of total portfolios volatility (TPV) represent the total number of reshuffles between two consecutive cabinets. So, for instance, for 16 portfolios a change of minister is observed when cabinet Andreotti VII replaces cabinet Andreotti VI.[14]

[14] Possibly, several of those changes involve only intra-party reshuffles; that is, albeit the person changes, the same party remains in control of the same portfolio.

Suppose now that a series of annual observations must be generated for the period 1987-1992. In principle, the ENP in a generic year t should be given by the ENP of the cabinet in office during that year t. However, only in 1990 one single cabinet stays in office for the whole year. In 1987, 1988, 1989, 1991 and 1992 two different cabinets are in office for different periods. For instance, in 1991, cabinet Andreotti VI, in office for the first three months and a half, displays a ENP equal to 2.232 whilst cabinet Andreotti VII, in office for the other eight and a half months, is characterised by an ENP equal to 1.98. Thus, more than one value of ENP is observed for year 1991 and a method must be defined to generate a unique annual observation from these two different values. The approach I have adopted is to compute this unique annual observation as a weighted average of the cabinet specific values, with weights equal to the proportion of time each cabinet stayed in office during the year. That is, ENP for 1991 is given by the weighted average of 1.98 and 2.232, with weights equal to 3.5/12 and 8.5/12 respectively. In general, the annual observation on the variable V for year t is computed as:

$$\text{(A1.1)} \quad V_t = \sum_{c=1}^{C} \frac{m_{c,t}}{12} \; V_c$$

where C is the total number of cabinets that are observed in office during year t, c is a generic cabinet in office in year t, $m_{c,t}$ is the period of time (in months) cabinet c remained in office during year t and V_c is the specific value of variable V observed for cabinet c.

Three basic features of the rule specified in (A1.1) must be immediately stressed. First, if a cabinet is in office for all the twelve months of a given year, than the annual observation on the variable V corresponds to the cabinet specific observation. So, in the example above, ENP in 1990 is equal to the ENP of cabinet Andreotti VI, the only one in office during that year. Second, if two or more cabinets are observed in office during year t, but are all characterised by the same value of the variable V, then this value is taken as the annual observation in year t. So, in the case of Italy, two different governments are in office in 1988 and 1989, but they display the same ENP of 2.232 and hence this is the value imputed to both years. Third, the rule can be used to generate time series with frequency different from the annual one. For instance, a quarterly series can be produced if C is taken to represent the total number of cabinets observed in office in a given quarter and 12 at the denominator is replaced by 3 (the number of months in a quarter).

To complete the sequence of annual observations from 1987 to1992, information regarding the cabinets in office during the first seven months of 1987 and the last six months of 1992 is necessary. From January to April 1987, the cabinet Craxi II is in office. The supporting coalition includes five parties: DC, PSI, PSDI, PLI and PRI, ENP is equal to 2.327 and CI to 0.668. Between April and July 1987, Christian Democrats form a single party minority government, for which ENP is equal to 1 and CI to 0. The degree of polarisation (POL) of the 1983-1987 legislature (during which these two cabinets are in office) is 39.6%. Thus, ENP in 1987 is equal to the weighted average of 2.327, 1 and 2.232 with weights equal to 3.5/12, 3.5/12 and 5/12 respectively. Similarly, CI in 1987 is equal to the weighted average of 0.668, 0 and 0.767, with weights as above. Finally, POL in 1987 is given by the weighted average of 39.6% and 36.9%, with weights equal to 7/12 and 5/12 respectively (7 are the months in 1987 during which the 1983-1987 stays in office, the other 5 months of 1987 falling under the 1987-1992 legislature). The cabinet in office for the last six months of 1992 is Amato I, supported by a DC-PSI-PLI-PSDI coalition. The cabinet specific ENP is 2.13, CI is 0.601 and the polarisation of the new legislature (1992-1994) is 21.6%. Since cabinet Andreotti VII and cabinet Amato I are in office for 6 months each during 1992, annual ENP, CI and POL can be computed as simple averages of the cabinet specific values above and those reported in the last row of Table A1.1

There is one exception to the general rule stated in equation (A1.1). This concerns the variables that measure portfolios volatility; namely, total portfolios volatility (TPV), party portfolios volatility (PPV) and ideological portfolios volatility (IPV). These are necessarily in the nature of "flows" and hence they must be imputed exclusively to the year in which they are observed. This implies that when data are organised with annual frequency, entries for TPV, PPV and IPV will be equal to zero in every year during which no cabinet change occurs. In years during which one (or more than one) cabinet change is observed, entries are set equal to the actual portfolios volatility observed..

Year	ENP	CI	TPV	POL
1987	1.900	0.514	47	38.475%
1988	2.232	0.767	17	36.9%
1989	2.322	0.767	22	36.9%
1990	2.322	0.767	0	36.9%
1991	2.158	0.629	16	36.9%
1992	2.055	0.587	29	29.25%

Table A1.2 *Annual observations on some political variables, Italy 1987-1992.*

Thus, in the case of the example above, TPV is equal to 0 in 1999, to 16 in 1991, 22 in 1989 and 17 in 1988. In 1987 it is the sum of the TPV associated with the single-party DC government in office between April and July (18) and the TPV associated with the cabinet Goria I (29). In 1992 TPV is the volatility associated with the cabinet Amato I (29). In the end, annual data corresponding to those reported in Table A1.1 are summarised in Table A1.2.

A1.2 Some explanatory notes to Tables 1.1, 1.2 and 1.3

- In Table 1.2, coalition cabinets are only those where two or more different parties share cabinet posts. Single-party governments receiving external support are not included.
- *Finland*: in Table 1.2, the total number of cabinets observed since World War II excludes 5 non-partisan cabinets.
- *Germany*: in all tables, the Christian Democratic Union (CDU) and the Christian Social Union (CSU) are considered as two distinct and autonomous parties, even if their elected representatives form a unique group in the Bundestag. The reason for that is that the CDU and the CSU are autonomous political entities, with their own independent decision making bodies and policy platforms.
- *Italy*: in Table 1.1, the total number of legislatures includes the Constitutional Assembly formed with the general elections of 1946.
- *Italy*: in Table 1.2, the total number of cabinets observed since World War II excludes the caretaker cabinet Dini I formed in January 1995.

2. CABINET FORMATION IN COALITION SYSTEMS

> *"Let me explain that. For each post the Communists get, the Socialists demand two. Then, Social Democrats and Liberals must receive one each. The rest is for us...."*
> (from the movie "Il Portaborse", by Daniele Lucchetti, Sacher Film srl Producer, distributed by Titanus, Italy, 1991).

Cabinet formation in coalition systems is essentially a process of bargaining over the allocation of decision making power and other office related benefits that take place among various political parties. Given that the cabinet is by institutional arrangement in charge of the actual implementation of real policy decisions (the parliament retaining the power to make and break the cabinet), the characterisation of this bargaining process and of its possible equilibrium outcomes is an important step towards a more complete understanding of economic policy-making. To this purpose, game theoretic analytical tools have been widely employed by both economists and political scientists and the first theoretical developments in the field can be dated back to the seminal contribution by Von Neumann and Morgenstern (1944). However, despite the considerable amount of theoretical work on bargaining in general, and on bargaining over cabinet formation in particular, relatively little has been done in the literature to perform systematic econometric testing of structural models. Notable exceptions include Laver and Shepsle (1996), Merlo (1997) and Diermeier and Merlo (1999).

In this Chapter I investigate both theoretical and empirical aspects of cabinet formation in coalition systems. On the theoretical side, the focus is on the construction of a model able to explain the occurrence of equilibrium delays in government formation. The casual observer of real world politics may note that a considerable spell of time often elapses between the resignation of a prime minister and the formation of a new cabinet. However, this stylised fact cannot be accounted for by most models, as they tend to yield equilibria with immediate agreement. I therefore represent the political bargaining process as a timing game, with equilibrium delays generated by the optimal strategic choices of players (i.e. the parties). The technical set up of the model builds on the generalised war of attrition approach (Fudenberg and Tirole, 1992 and Bulow and Klemperer, 1997), but it involves an important innovative feature relative to existing applications of the same approach. Whilst in existing applications the generic

player i always knows with certainty his own nature (i.e. his individual cost of bargaining and/or his own valuation of the prize of the game), in the version I discuss, under some circumstances, player i does not know his own type. This strong form of uncertainty is then incorporated into the characterisation of the Nash symmetric equilibrium.

The theoretical model of bargaining I propose is rooted quite firmly in the tradition of a recently proposed *portfolios allocation approach* to government formation (Austin Smith and Banks, 1990; Laver and Shepsle, 1990 and 1996). The central argument developed in this approach is that parties negotiate over the distribution of a small set of key portfolios and that a cabinet is formed only when an agreement on who controls these key portfolios is reached. However, two further approaches have been presented in the literature. In the first one (see, for instance, Merlo, 1997) the object of bargaining is taken to be the allocation of a cake (the set of cabinet posts), with parties interested in obtaining the largest possible slice. In the second one (see, *inter alia*, Baron 1991 and Diermeier and Merlo, 1998), parties are assumed to bargain directly over policy contents, so that the outcome of the negotiation is a *master-plan* containing the details of the policies to be implemented by the government. Two models built in the spirit of these two alternative approaches are considered in this Chapter in addition to the model of war of attrition.

Much of the added value of this Chapter is contained in the empirical section, where the predictions generated by the theoretical models are subject to systematic econometric analysis. Attention is focused on the determinants of the duration of the cabinet formation process, to the number of cabinet posts that the *formateur* is able to secure in equilibrium and to the degree of "balance" of the outcome of the bargaining process. The use of the indicators included in the data-set described in Chapter 1 allows a more sophisticated representation of several political factors relative to earlier contributions tackling similar or related issues (Laver and Schofield, 1990; Merlo, 1997; Diermeier and Van Roozendaal, 1998).[1] Thus a set of new results are produced, which can also be taken as a starting point for future theoretical and empirical research on this topic.

The rest of the Chapter is organised as follows. Section 2.1 surveys the literature on government formation. Sections 2.2 and 2.3 discuss the three theoretical models I will

[1] In fact, only the first two issues (duration of cabinet formation process and share of portfolios secured by the formateur) has received some limited attention in the applied literature so far. To the best of my knowledge, no attempt has ever been undertaken to provide an empirical representation for the degree of balance of the outcome of a bargaining game and to study its determinants.

be using as guidelines for the empirical analysis. The model of war of attrition, representing an innovative contribution, is described in details in Section 2.2, with some mathematical proofs contained in Appendix A2.2. The other two models are instead adaptations to the specific case of cabinet formation of rather well known strategic forms of bargaining games. Thus a simple discussion of the predictions they generate is given in Section 2.3 and a more technical treatment of both models is postponed to Appendix A2.3. Section 2.4 contains the empirical analysis. Here, links between the theories and the empirical proxies are emphasised and results discussed in the light of ex-ante expectations. A brief description of the econometric techniques used is also given. Details on the technical definition of the political indicators can be found in Appendix A2.4.[2] Section 2.5 concludes. Tables with the full set of econometric results are in Appendix A2.1.

2.1 Government formation in the literature.

The analysis of government formation starts with the seminal contribution by Von Neumann and Morgenstern (1944). They consider a simple multi-party, zero-sum game, where the total number of seats in the legislature is distributed among n players. The share of seats of the generic player i is l_i and $l_i < 0.5$ for any i ($i = 1,\ldots,n$). Government formation requires a coalition of parties to be identified so that the sum of the shares of seats of coalition partners is larger than the threshold majority 0.5. [3] They then make the assumption that parties are exclusively interested in the appropriation of the benefits and the patronage associated to office (i.e. parties are purely office-motivated). This implies that office is regarded as a sort of fixed prize (a cake) to which only coalition partners have access. Since every bit of the cake won by one party must be lost by another-one, the incentive is to form viable coalitions with a small number of partners. More precisely, to maximise the expected payoff of its members, the coalition must be *minimal* in the sense of excluding the presence of any party whose contribution (expressed in terms of parliamentary seats) is not absolutely necessary to achieve majority.

[2] Additional results concerning sensitivity analysis are not reported in the Appendix to save space. They are clearly available upon request.

[3] Implicit in the formulation of the problem is the idea that minority governments are regarded as pathologies. This view has indeed survived until convincingly challenged by Strom (1990).

Several authors have proposed refinements of the *minimal winning* solution concept for the coalitional game analysed by Von Neumann and Morgenstern. Riker (1962) builds on Gamson (1961) to argue that each party in the coalition must receive a slice of the cake which is proportional to its share of coalition seats. Thus, payoff maximisation requires that of all possible minimal winning coalitions, the one with the smallest total number of seats (i.e. a bare majority coalition) will actually form. Leiserson (1966) instead suggests that the minimal winning coalition with the smallest number of parties is most likely to be observed in the real world. Axelrod (1970) develops a theory of conflict of interest where parties are not only office motivated, but also care about ideology and policy outcomes. His argument is that any party will look for potential partners in its ideological neighbourhood first, so that only *ideologically connected* coalitions should be formed. De Swaan (1973) extends this idea by formulating the solution concept of *closed minimal range coalition*. This predicts that the ruling coalition will be formed by the set of parties to which the smallest dispersion on an ideological Left-Right continuum is associated.

Early contributions are thus concerned with the definition of a theory able to predict "who gets in". Laver and Schofield (1990) report the results of various tests of these predictions. The strategy for such tests is to compare the predicted party membership of a coalition according to a given theory of coalition formation with the actual party membership and then see whether the frequency of correct predictions is higher than the frequency of correct predictions obtained when coalition predictions are randomly picked out of a hat. Among the policy blind theories (namely those that assume purely office-motivated parties), the one that performs the best seems to be the minimal winning solution concept of Von Neumann and Morgenstern (predictions are correct about 40% of the times), which also significantly outperforms the random picking of prediction out of a hat. The ideology-based solution concept proposed by Axelrod has a less convincing performance. Its success rate (computed for the specific case of Italian party system in the early '70s) is only 20%, just 8 percent points higher than the one obtained with random picking. However, this should not be taken as a reason to reject ideology-based theories. On the contrary, a corollary of these theories has significant empirical relevance. This corollary states that a pivotal role in negotiations is played by the median party. If the ideological space is uni-dimensional, then a median party can be always identified as the one whose share of seats added to the shares of seats of the parties on its left on the Left-Right continuum makes the total sum of shares larger than the majority threshold 0.5. Henceforth, no ideologically

connected coalition can be formed that does not include the median party. This places the median party in an almost dictatorial position, significantly increasing its chances of being included in the coalition that effectively forms, and making it very likely that its policy preferences will be reflected to a large extent into the policy choices of the government. The empirical analysis in Laver and Schofield (1990) shows that the median party does play such a key role and it is indeed very often an important member of the ruling coalition.

Analogous *centripetal tendencies* are exhibited by all models that assume a uni-dimensional policy space. Van Roozendaal (1993) elaborates on the median party argument and finds that the theory fits the real world quite well even for a complicated party system such as that of the Netherlands throughout the period following the First World War. Moreover, the argument can also be used to provide a first systematic account of the existence of minority governments. As long as the median party supports the incumbent government, any alternative coalition must be non connected. Given that non-connected coalitions should be less likely to form, the incumbent can stay in office even if the median party is small and/or the ruling coalition does not control the absolute majority of seats.

More recent models of government formation consider a multi-dimensional policy space. Here a new complication arises relative to uni-dimensionsal accounts of government formation: the core of the voting game might be empty (which is never the case in uni-dimensional models, since a median party always exists) and, as a consequence of that, stable equilibrium solutions cannot be guaranteed. McKelvey (1976 and 1979) first describes a pattern of voting cycles with continuous formation and disruption of coalitions of different parties (the *chaos theorem*). Schofield (1986) shows that some institutional arrangements might be able to reduce the chaos by significantly reducing the number of dimensions of a given policy space. Baron (1991) develops a spatial bargaining theory for the case of a three party-system with two dimensions. The relatively low number of players and dimensions allows him to fully characterise the possible equilibrium outcomes of this bargaining process. In a nutshell, he obtains that with two large parties and a small one (and the small one located at the median on at least one of the two dimensions), government will be formed by the *formateur* (one of the two large parties) and the small party and that this latter will have some influence on the policy agreement. This prediction seems appropriate to describe coalition politics in Austria and Luxembourg in the '70s.

Baron and Diermeier (1998) consider again a two-dimensional policy space with three parties whose preferences over policy outcomes and benefits from holding office can be represented by a quasi-linear utility function. A formateur is selected by a non-strategic Head of the State. The rule for the selection of the formateur is based on the parliamentary size of parties: each party is formateur with a probability equal to the share of seats it controls (this is the rule which is found to have more empirical relevance by Diermeier and Merlo, 1999). The selected formateur makes a proposal consisting of a party membership of government, a policy agreement to be implemented once government has been formed, and transfers among coalition partners. The proposed government is installed, and the associated policy undertaken, if accepted by a majority in parliament. If formation is unsuccessful, a caretaker government maintains the status-quo policy until next elections. It turns out that in equilibrium the formateur forms a government with that other party which is more disadvantaged by the status-quo, provided that the ideal policy point of this other party is not too distant from that of the formateur. The forming government is majoritarian (minimal winning), unless the status-quo is extreme, in which case a consensus government with the participation of all the parties forms. In terms of contents of the policy agreement, as in Baron (1991), agreed policy reflects the policy preferences of the partner(s), but is closer to the ideal point of the formateur.

All models briefly surveyed so far do not account for two important aspects of real world politics. First, the ruling coalition is often already well defined when negotiations over government formation take place. This means that the definition of the ruling coalition and the definition of the agreement over the allocation of portfolios among coalition partners and/or of a common policy proposal occur at different stages. Strom (1990) classifies coalitions according to the degree of their identifiability to voters. In quite a large number of cases, coalitions in western European parliamentary democracies are well identified before that elections are held; that is, they are determined (in terms of definition of the set of coalition partners) before that bargaining over the actual formation of the cabinet begins. The same point is convincingly made by Merlo (1997) in the specific case of Italy. Second, policy outcomes are not determined exclusively by the strategic interaction in the legislature at the time of formation. That is, the institutional design prevailing in western European coalition systems is such that the most important policy decisions are taken by the executive. Of course, as noted in the Introduction, the parliament does have the power to make and break the cabinet. But this does not mean that countries are governed by their legislatures. On the contrary,

policy outcomes are most likely to be determined as the result of the accumulation of individual cabinet members' decisions with regard to their responsibilities. Apart from the definition of the set of parties in the ruling coalition, then specific attention must be paid to the way in which portfolios are allocated to the various coalition partners.

The first aspect (ruling coalitions already identified when negotiations over cabinet formation start) is explicitly incorporated in the models proposed by Merlo (1997) and Diermeier and Merlo (1998). Merlo takes the electoral results and the ruling coalition as given, thus focusing on intra-coalitional bargaining. In his model the utility function of generic coalition partner i is increasing in the time this party stays in office, so that the object of negotiations is represented by a cake whose size is the expected duration of the forming cabinet. In most models of government formation the cake is taken to be of fixed size; Merlo, however, assumes that size depends on the realisation of a Markov stochastic process. Coalition partners first observe the realisation of a state of the nature, then a formateur is selected according to a rule based on the parliamentary size of parties (as in Baron and Diermeier, 1998). The formateur makes a proposal over the allocation of a cake. If accepted by all partners, the proposal is implemented and the cabinet formed. If it is not accepted, then a new state of the nature is realised and a new formateur is selected. The process continues until either an agreement is achieved or an explicitly imposed deadline expires. The model yields predictions concerning the duration of negotiations over cabinet formation as well as government durations. These predictions are then tested using data on Italian governments over the period 1948-1994. The density of negotiation durations predicted by the model turns out not to be statistically different from the empirical density. A similar result is obtained for the density of predicted government durations. Interestingly, policy experiments show that the mean expected duration for a majority coalition is twice as large as the mean expected duration for a minority government, and that mean expected government duration decreases as economic conditions get worse (high inflation). Finally, changes in the proposer selection process do not alter the duration of negotiations whilst a stricter deadline would reduce both duration of negotiations and survival in office.

Diermeier and Merlo (1998) develop a spatial model of government formation in a three-party parliamentary system where none of the three parties is in control of a majority of seats. Again, negotiations start with the selection of a formateur according to a proportional rule based on the parliamentary size of parties. The formateur then chooses a proto-coalition (D), which could include just the formateur or the formateur and any of the other two parties, or even the formateur and both of the other two parties.

Once identified, the proto-coalition determines a transfer (t) to be paid to non-coalition parties in exchange for support. Given the party membership of the proto-coalition and the size of the transfers, the parliament votes to approve the formateur' s proposal of D and t. If this proposal is rejected, then the formation attempt fails and a status-quo policy Q is implemented. If instead the proposal is accepted, negotiations over the formation of a new government start between the members of D. Thus, first the potential ruling coalition (that is, the proto-coalition) is identified, then intra-coalition negotiations over government formation take place. Diermeier and Merlo assume that parties in the proto-coalition negotiate over policy outputs and transfers within the coalition. A government is therefore formed when an agreement on a common policy proposal and a vector of transfers is identified. The implementation of such proposals and payments will determine a specific allocation of the cake, whose size now depends on the composition of the proto-coalition and on the status-quo policy Q. This latter can in turn be interpreted as the state of the economy or the political environment. In equilibrium, both majority and minority coalitions can be formed. However, minimal winning coalitions are not the norm. This theoretical result is consistent with observed empirical regularities.

With respect to the second consideration (central role of the cabinet in policy formation, with the parliament retaining the power to make and break the cabinet), Austin Smith and Banks (1990) and Laver and Shepsle (1990 and 1996) propose an innovative *portfolios allocation approach* to government formation. In this approach, each government is characterised by the specific allocation of a small set of key portfolios among coalition partners. Policy outputs on any dimension will be heavily affected by the policy preferences of the individual (or party) in control of the portfolio whose jurisdiction extends over that particular dimension. The central implication of this *departmental character* of the decision-making process is that the set of implementable policies is not given by the entire policy space of the coalition, as it would be in a spatial model of legislative bargaining, but only by those policies that result from feasible allocations of portfolios. It then follows that policy-motivated parties will bargain over the distribution of the key portfolios as a mean to obtain policy outputs as close as possible to their ideal policies. A government is therefore formed only when a stable allocation of portfolios (i.e. an allocation of portfolios such that no alternative allocation is preferred by a majority in the parliament) is achieved. Moreover, policy outputs change when portfolios are reshuffled within the same set of parties. So, for instance, the policy outputs associated with a government where party A

holds the portfolio of finance and party B holds the portfolio of foreign affairs are different from those associated with a government where party B controls the portfolio of finance and party A the portfolio foreign affairs.

Laver and Shepsle (1996) provide systematic empirical testing of the key predictions generated by their version of the portfolios allocation approach with three parties and two dimensions (i.e. two key portfolios). These predictions concern the role of *very strong* and *merely strong* parties. The former is a party whose location on the two dimensions is such that no majority in the parliament prefers an allocation of portfolios alternative to the one where the very strong party holds both portfolios. The latter is a party that participates in any cabinet preferred by a majority in the parliament to the one where the merely strong party holds both portfolios. The theory predicts that if a very strong party exists, then it is assigned all portfolios, so that the policy output coincides with that party's most preferred policy on each dimension. Merely strong parties, instead, should always participate in government, but do not necessarily hold all key portfolios. Moreover, let G be the government where a merely strong party controls both portfolios. If all cabinets preferred to G by a majority of voters assign the same portfolio j to the merely strong party, then the merely strong party will participate in a cabinet and receive control of portfolio j. The empirical test is structured as a comparison between two rates of success, one derived from the theory and one obtained under the assumption that there is no systematic pattern in government formation and hence that portfolios are allocated randomly. The evidence suggests that the theoretical model has quite considerable predictive properties. In particular, it does appear that very strong parties are able to form cabinets where they effectively control all or most of the key portfolios. Since a party is very strong if located at the generalised median of the two dimension, this result can be seen as the two-dimensional counterpart of the centripetal tendencies previously observed for uni-dimensional models.

A limitation of the models developed by Laver and Shepsle (1990 and 1996) and Austin Smith and Banks (1990), but which is common to most models in the literature, with the exception of Merlo (1997), is that they yield equilibrium with immediate agreement. This is contrasts with the observation that in real world politics negotiations over cabinet formation take quite a long time and hardly terminate with the first proposal of the formateur. Models where formation delays occur in equilibrium as a consequence of the optimal strategic behaviour of parties (and in spite of the fact that they represent a cost for the society) are therefore needed. This essential feature is

incorporated in the model of war of attrition I propose as a possible formalisation of the political bargaining game.

2.2 Cabinet formation as a war of attrition

A distinctive feature of the portfolios allocation approach is that it builds on a set of assumptions concerning the social context of government formation that are directly derived from observed regularities in coalition systems. In order to make the theoretical model as close to the real world as possible, I move from the same assumptions, which are outlined in Subsection 2.2.1. The description of the structural setting is done in two steps. First, in Subsection 2.2.2, the qualitative features of the model are presented for the case of a simple two-party government. Then, in Subsection 2.2.3, the set-up is extended to include more than two parties.

2.2.1 Stylised facts and assumptions on the social context of government formation

The construction of a model of cabinet formation requires some assumptions to be stated concerning: (i) the type of incentives which parties involved in bargaining can have, (ii) the specific form of the decision making process within the executive, (iii) the relationship between a party and its members sitting in the cabinet, (iv) party's valuation of different portfolios. Following Laver and Shepsle (1996), I move from a set of stylised facts observed by country experts in coalition systems to formulate these assumptions.[4]

In democratic countries, political parties are identified by specific public policy positions. These are defined by party members in regularly held meetings and conventions and reported in electoral manifestos. The important point to note with respect to party's incentive is that any party cares about policy; that is, any party bargains to obtain a final policy output that reflects its own policy position to the largest possible extent. This interest in the contents of the policy undertaken by the government exists not only for ideologically-motivated parties, which bear a cost if a policy different from their preferred one is implemented, but also for electoralist parties. As a matter of fact, by displaying some policy concern, office-motivated parties can reinforce long-term credibility with voters and potential partners, thus increasing their chances to

[4] Country expert reports to which I refer are those collected in Laver and Shepsle (1994) and Browne and Drejimanis (1994).

stay in power. In general, the idea of parties with an explicit interest in policy outcomes has been incorporated into recent contributions through the assumption that the utility of any player involved in the bargaining process is decreasing in the Euclidean distance between that party's preferred policy and the actual policy carried out by the government.

Country experts notice that decision making in coalition systems is often decentralised at departmental level. This means that, in spite of the constitutional provision of collective responsibility for cabinet decisions, individual ministers enjoy a considerable degree of autonomy in setting policies in those areas that fall under their jurisdiction. Ministers' discretion can take several forms. For instance, a minister has some degrees of freedom in deciding whether or not an issue should be brought to cabinet meetings. But even when discussed in cabinet meetings, detailed proposals of a minister are seldom opposed or modified by other ministers. Laver and Shepsle (1994, page 296) make this point very clear in their summary of the evidence collected for coalition systems: "[G]iven the intense pressure of work and the lack of access to civil service specialists in other departments, it seems unlikely that many cabinet ministers will be able successfully to poke their noises very deeply into the jurisdictions of their cabinet colleagues". The departmental character of the decision making process bears an important implication: policy decisions in a given area will heavily reflect the preferences of the individuals in control of the portfolios whose jurisdiction extends over that specific area. It then follows that government formation should be studied as a bargaining process over portfolios allocation with the focus on "who gets what".

An important question often raised in the literature concerns the degree to which individual ministers in a cabinet are willing to implement the polices preferred by their own parties. In other words, given the preferred policy that a party would like to have undertaken, the point is to ascertain whether or not the minister(s) sitting in the cabinet and member(s) of that party will effectively pursue that policy. In general terms, although the public policy position is unique, intra-party divergence of preferences cannot be ruled out. Internal disagreement is to some extent a desirable feature of modern democratic political formations. However, the observed tendency in coalition systems is that when interacting with the outside world (electorate, coalition partners, opposition, etc..), parties have an incentive to behave as *unitary actors*. Individual cabinet ministers thus promote and defend the policy position of their party and can actually be regarded as representatives of the policy interests of that party. This idea is reinforced by the observations that almost every party establishes some forms of

punishment for any of its members who openly defy party's positions and that parties enter and leave coalitions as unitary blocks. Ultimately, the policy preferences of ministers can be assumed to coincide with those of their parties, and hence parties can be assumed to be faithfully represented by their members.

There is a considerable consensus among country experts on the fact that the policy space is multi-dimensional and that voters assign varying degrees of importance to different dimensions. From the point of view of the politicians, given the decentralised structure of the decision making process and the interest in policy outcomes, this means that some portfolios are more valuable than others. More specifically, portfolios could be ranked according to the importance of the dimensions that fall under their jurisdictions. Laver and Hunt (1992) construct such ranking for the western European coalition systems. Interestingly, they observe that the portfolio of finance is top-ranked in all countries, thus confirming the centrality of economic issues. The second most important portfolio is the one of foreign affairs in all but two countries. In only a few countries can a third most important portfolio be identified. According to Laver and Hunt, in no country does a fourth most important portfolio emerge from the group of "other portfolios". The large gap between the first portfolio and the others, however, suggests representing the set of *key portfolios* with a very low dimensionality and eventually as including just one item (the key portfolio of finance). This assumption is consistent with the trend exhibited by most of the recent theoretical literature where either uni-dimensional or two-dimensional systems are considered.

The general picture which emerges from the combination of these regularities can be sketched as follows. Parties are interested in policy outcomes in the sense that they prefer policies which are closer to their public policy positions. The departmental structure of decision making implies that the contents of the policy effectively implemented by the cabinet in a given area reflects the preferences of the minister in control of the portfolio with jurisdiction over that area; such preferences are those of the party of which the minister is a member. Voters assign considerable importance to economic issues and to a few other dimensions of the policy space. This implies that parties are effectively interested in obtaining control of the key portfolio of finance and eventually of another one or two portfolios. The cabinet is therefore formed only when coalition partners reach an agreement over the distribution of these key portfolios.

2.2.2. Bargaining in a two-party coalition

In accordance with the discussion of Subsection 2.2.1, I present a model of government formation where parties bargain over the allocation of the key portfolio of finance. Obtaining control of such portfolios is the necessary and sufficient condition to maximise a party's utility function. To allow for equilibrium delays in formation, the strategic interaction is formalised using the approach of the war of attrition, originally proposed in the theoretical biology (see Maynard Smith, 1982) and subsequently extended by Fudenberg and Tirole (1992) and Bulow and Klemperer (1997).[5] Throughout this and the following Subsections I follow Merlo (1997) and take the proto-coalition set as given.

The rules of the game are as follows. Let n be the number of parties in the coalition. At the beginning of the formation attempt, each party demands control of the key portfolio of finance (the object of bargaining) and refuses to leave it to any other party. Then each party holds out in the hope that the others will give up first. Since delaying formation is costly and the value of being in control of the key portfolio must be finite, any player is ready to keep on waiting only for a limited spell of time. Suppose that the cost of waiting is identical for all players, but that they value the prize of the game differently; that is, different parties attach different importance to being in control of the key portfolio of finance.[6] Then, the party with the smallest prize valuation is the first to concede, leaving the game with $n-1$ survivors. The party with the second smallest prize valuation is the second to give up and so on. The game terminates, and the cabinet is formed, when only one survivor is left. This party receives control of the key portfolio and is therefore able to promote economic policies consistent with its preferred ones. Notice that to the extent that prize valuations are private information, the identity of the winner is not known ex-ante and therefore the game must be played for information to be released. The consequence is that a delay in cabinet formation is effectively observed.

[5] The approach of war of attrition has been used in a different context from the one considered here by Bliss and Nalebuff (1984), Alesina and Drazen (1991), Drazen and Grilli (1993) and Casella and Eichengreen (1994). For a survey of economic applications of the approach see Drazen (2000).

[6] Thus, parties (i.e. their leaders) are of different nature. Albeit a true policy concern exists for them all, some parties value the control of the key portfolio (and hence ability to produce preferred policy outcomes) more than others do. As discussed by Bulow and Klemperer (1997), in the context of the war of attrition, the assumption that differences in nature generate different prize valuations is equivalent to the assumption that they generate differences in the size of bargaining costs.

A simple set up for the two-player game is as follows. Negotiations start at time t=0. The instantaneous cost of bargaining (that is, the cost of waiting in the hope that the other party will give up its demand first) is the same for both parties and equal to $\kappa > 0$[7]. The highly decentralised structure of decision making implies that economic policy is decided by the party in control of the key portfolio of finance. Therefore, given that both parties care about policy, the other party (the one not in control of the key portfolio) suffers a post-formation instantaneous disutility cost equal to δ_i. The post-formation utility of the winner is instead equal to 0. The parameter δ_i reflects the nature of the party (i.e. of its leaders); it is therefore party-specific and known only to the party itself. Therefore, the model is characterised by heterogeneity of players and private information. The party's expectations concerning the duration in office of the cabinet are captured by the discount factor ρ, which is again assumed to be identical for the two parties and common knowledge. Thus, starting at time $t = 0$, both parties refuse to concede control of the key portfolio to the opponent. They bear the instantaneous cost κ in the hope to gain a prize of value:

$$(2.1) \quad \upsilon_i = \delta_i / \rho$$

Equation (2.1) is simply the difference between the present discounted value of the post-formation utility flows of the winner and of the loser. Given the assumptions on δ_i, the prize valuation υ_i is party-specific and private information of player *i*. However, as it is common in the literature, I assume that the distribution $F(\upsilon)$ from which individual υ's are drawn is common knowledge.

Players weigh the costs of waiting against the expected benefits from waiting and thus determine an *optimal time of concession* $T(\upsilon_i)$. This time indicates the maximum spell party *i* is willing to hold out for the control of the key portfolio. If at $T(\upsilon_i)$ the opponent *j* has not given up yet, then party *i* concedes, thus leaving *j* with the prize of the game. In the symmetric Nash equilibrium, the behavioural function $T(\upsilon)$ is identical for the two players, but, since they have different prize valuations, optimal concession times will be different. Moreover, $T(\upsilon)$ can be shown to increase monotonically with

[7] Formation delays represent a cost for the society (see Merlo, 1997). This generates a political cost for the parties involved (i.e. the cost of being regarded as responsible for the disruption of the normal course of the democratic process). In addition to that, parties bear direct costs of bargaining (resources and time spent for lobbying activities and meetings). In the next Subsection, these two components of the cost of bargaining (the political costs and the direct costs) are separated.

respect to υ, so that the player with the lowest prize valuation is effectively the first to give up. Appendix A2.2 builds on Bliss and Nalebuff (1984) and Alesina and Drazen (1991) to provide an analytical account of the symmetric Nash equilibrium. Intuitively, a generic player i finds it optimal to stay in the game up to the point where the cost of fighting for an additional instant is equal to the expected benefit from fighting for that additional instant. The equilibrium condition which implicitly defines the optimal time of concession is therefore:

$$(2.2) \quad \upsilon\left[\frac{f(\upsilon)}{1-F(\upsilon)}\frac{1}{T'(\upsilon)}\right]=\kappa$$

where $f(\upsilon)$ is the density associated to $F(\upsilon)$ and $T'(\upsilon)$ is the first derivative of $T(\upsilon)$.

On the l.h.s. of equation (2.2) is the expected benefit from fighting for an additional instant, say from t until $t+dt$. This is given by the value of the prize, times the *hazard rate* (in brackets). The hazard rate is the probability that the other party will concede between t and $t+dt$, conditional on the observation that it has not yet conceded at time t. On the r.h.s of (2.2) is the instantaneous cost of bargaining, that is, the price that the party must pay in order to hold out until $t + dt$.

Let υ_{min} and υ_{max} be the commonly known supports of the distribution $F(\upsilon)$, then the behavioural function $T(\upsilon)$ is immediately obtained from condition (2.2):

$$(2.3) \quad T(\upsilon)=\kappa^{-1}\int_{\upsilon_{min}}^{\upsilon} x\frac{f(x)}{1-F(x)}dx$$

with the boundary condition $T(\upsilon_{min}) = 0$.

The optimal time of concession of a player i is obtained from (2.3) evaluated at $\upsilon=\upsilon_i$; that is the optimal time of concession for party i is $T_i = T(\upsilon_i)$. Given ρ and κ, to the extent that δ_i is different from δ_j, the two prize valuations υ_i and υ_j are different and the optimal concession times T_i and T_j are different as well. Notice that if prize valuations were public knowledge at time $t = 0$, then it would be immediately clear who will emerge as the winner. There would be no reason for the parties to engage in the war of attrition and the cabinet would be formed without delay. The assumption that prize valuations are private information makes it rational for both parties to postpone concession. This implies that cabinet formation is delayed in equilibrium as a

consequence of the strategic behaviour of parties involved in negotiations. The only exception is represented by the case in which the prize valuation of one of the two parties is equal to the lower bound of the distribution $F(\upsilon)$, υ_{min}. In fact, since the supports of the distribution are assumed to be common knowledge, a player with the minimum possible prize valuation knows with certainty that he will be the first one to give up and hence there is no incentive for him to carry on waiting. This is the meaning of the boundary condition in equation (2.3).

In the two-player case only one concession must be observed before the game is solved and the cabinet formed. This means that the duration of the formation process is equal to (2.3) evaluated at the lowest between υ_i and υ_j. Let $\tilde{\upsilon}$ be this lowest prize valuation. Then the delay in cabinet formation is increasing in $\tilde{\upsilon}$. A higher $\tilde{\upsilon}$ generates a higher disutility for the loser. In this simple set-up the size of the utility loss is taken to be exogenous. In the next Subsection instead, the loss will be proportional to the Euclidean gap between the policy of the winner and the policy of the loser, so that in more ideologically heterogeneous coalitions the value attached to being in control of the portfolio of finance is higher, and negotiations last longer for any distribution of the prize valuations. Finally, the formation delay is decreasing in the instantaneous cost of bargaining κ. This result should not be surprising: the more parties have to pay to postpone formation, the less willing they are (for any prize valuation) to delay the agreement.

2.2.2 Bargaining with more than two parties

The simple set up of the previous Subsection is now extended to embrace the following complications. First, the game is generalised to K+1 players, so that K concessions must be observed before the cabinet is formed with the allocation of the portfolio of finance to the last survivor. Second, the size of the disutility cost is endogenous to the outcome of the bargaining process, in the sense that it is proportional to the Euclidean gap between the ideal policy of the looser and the ideal policy of the winner. Third, parties bear the full cost of bargaining κ; but after concession and until the game is actually over they still pay a proportion γ of the full cost corresponding to the political costs of delaying stabilisation (see footnote 7).

Let θ_i represent the preferred policy of party *i* on a Left-Right ideological continuum and θ^* the policy effectively implemented by the government. Then, the post-formation instantaneous utility of party *i* is written as:

$$(2.4) \quad u_{i,t} = -\delta_i(\theta^* - \theta_i)^2 \quad \text{with } 0 \le \theta_i \le 1;\ 0 \le \theta^* \le 1; \delta_i > 0$$

The parameter δ_i in equation (2.4) accounts for the party-specific degree of importance attached to policy contents. Although all parties care about policy, some are likely to be more "hard-nosed" than others. This could be, for example, a consequence of the different degree of pressure exercised by supporting constituencies and/or of the different stability of the typical electorate of different parties. In short, δ_i is meant to capture the intrinsic degree of focus on policy issues of party *i* (i.e. of its members and leaders) and is therefore obvious to assume that it is known with certainty only by the party itself. For brevity, in what follows I will use δ_i to refer to the "party-specific policy focus". Notice also that in equation (2.24) the ideological Left-Right continuum has been normalised to an interval that runs from 0 to 1.

The departmental structure of the decision making process implies that θ^* in equation (2.4) is equal to the policy preferred by the winner of the war of attrition (namely, the last survivor). Thus, if party *i* is the winner, then $\theta_i = \theta^*$ and its post-formation utility is equal to 0. If instead party *i* is one of the K losers, then $\theta_i \neq \theta^*$ and party *i* receives a negative utility proportional to its specific degree of interest in policy outcomes. As in the previous Subsection, expectations over the duration in office of the government are incorporated into the common discount factor ρ. The difference between victory and defeat is therefore equal to the present discounted value of the disutility flow of the loser:

$$(2.5) \quad \upsilon_i = \frac{\delta_i(\theta^* - \theta_i)^2}{\rho} \quad \text{with } \theta_i \neq \theta^*$$

The prize valuation υ_i defined in equation (2.5) is the equivalent of the *player's type*, to which Bulow and Klemperer (1997) and most of the game theoretic literature commonly refer. In existing applications of the war of attrition, however, player *i* always knows his own type. The specification in (2.5), instead, introduces an innovative complication: the prize valuation υ_i (and hence player *i*'s type) might be not known with certainty even by party *i* itself. More specifically, υ_i is not known with certainty by party *i* until the end of the game, unless the game is a two-party negotiation or, in a negotiation involving more than two parties, unless the game has reached the final stage

where only two survivors are left and i is one of these last two. To see this, consider that to know υ_i with certainty, party i must know with certainty both its own δ_i and the size of the Euclidean gap $|\theta^*-\theta_i|$ when $\theta_i \neq \theta^*$. By assumption, the party specific policy focus δ_i is always known with certainty by party i. It is also assumed that the policy positions of all coalition partners are common knowledge. However, this is not enough to guarantee that the Euclidean gap is known with certainty. Suppose that the game is at a stage where three survivors are left: i, j and z. If player i decides to give up at time t, then the winner might be either j or z. The uncertainty of the identity of the winner is, however, resolved at some time in the future. At time t, when comparing the marginal costs of bargaining against the expected benefits from bargaining to decide whether to quit or no, party i does not know whether its instantaneous disutility is going to be $-\delta_i(\theta_j-\theta_i)^2$ or $-\delta_i(\theta_z-\theta_i)^2$. In other words, party i is unsure about the difference between victory and defeat (to the extent that z and j do not share the same ideological location) and hence it is uncertain about its own prize valuation. Notice that this uncertainty arises in spite of the fact that the policy positions of the three parties are common knowledge and each party knows its own party specific policy focus δ. Uncertainty disappears only if player i is left in the game facing just one opponent, say j. In this case, in fact, player i knows that if he decides to quit, then j is the winner and hence his disutility cost is going to be $-\delta_i(\theta_j-\theta_i)^2$.

The form of uncertainty just described implies that to identify his equilibrium strategy, player i has to form a rational expectation over the identity of the winner. This means taking expectations over equation (2.5) as follows:

$$(2.6) \quad \upsilon_i = \frac{\delta_i}{\rho}\left[E_t(\theta^* - \theta_i)^2\right] \quad \text{with } \theta^* \neq \theta_i \quad \text{and } t < \tau$$

where τ is the time of formation; that is, the time at which one of the last two survivors gives up.

To operationalise equation (2.6) consider a sequence of stages of the game. Let m_n be the *risk set* (that is, the set of parties that have not yet given up) at generic stage n. In the initial stage 1, all the K+1 players are involved, so that $m_1 = K+1$. Eventually, one of them will give up, the risk set shrinks to $m_2 = K$ and a new stage begins. Each stage thus begins when one of the players decide to leave the competition. At stage n, the risk set is reduced to $m_n = K+1-(n-1)$ parties. Also assume that the distribution of player' types

$F(\upsilon)$, with supports υ_{min} and υ_{max}, is common knowledge[8]. The explicit algebraic expression for a rational expectation taken over (2.5) can then be specified as follows:

$$(2.7)\ \upsilon_{i,n} = \frac{\delta_i}{\rho}\left[\sum_{i \neq j}(\theta_j - \theta_i)^2 f(\upsilon_j)[F(\upsilon_j)]^{m_n - 1} m_n\right]$$

where $f(\upsilon)$ is the density associated to the distribution $F(\upsilon)$.

Equation (2.7) thus defines the prize valuation for generic party *i* at the generic stage *n*; that is, when *n-1* parties have already dropped out of negotiations. Intuitively, to form an expectation about the size of the Euclidean gap in case of defeat, player *i* must take the weighted average of all Euclidean gaps between its own policy position and the policy position of any coalition partner *j*, with weights represented by the probability that any given *j* is the winner. When optimal concession times are increasing in prize valuations (as it is the case in this context, see Appendix A2.2 for technical details), this weighted average is given by the term in brackets on the r.h.s. of equation (2.7).

The distinctive feature of equation (2.7) is that the prize valuation is increasing in the ideological dispersion of the policy positions of the coalition partners. The intuition behind this result is quite straight-forward. A higher degree of ideological heterogeneity makes party *i* more uncertain about the contents of economic policy. This increases the risk that, in case of defeat, a policy significantly different from its ideal ones could be implemented and makes party *i* value the control of the key portfolio more. That is, for any given value of the party specific policy focus δ, the difference between victory and defeat increases and the potential post-formation disutility grows.

Each party trades off the cost of bargaining for an additional unit of time against the expected benefits from carry on bargaining to determine the optimal concession time at any stage of the process, given the sequence of observed exits and the size of the risk set. So, at the generic stage *n*, party *i*, with prize valuation $\upsilon_{i,n}$, will exit negotiations, if none of the other m_n - 1 parties in the risk set gives up first, $T(\upsilon_{i,n})$ units of time after the beginning of that specific stage *n*, where $T(\upsilon_{i,n})$ is defined by:

[8] This in turn requires the policy positions of all coalition partners to be common knowledge, fixed through the duration of the game and chosen independently form the party-specific δ. All these three assumptions appear to be quite reasonable.

$$(2.8)\ T(\upsilon_{i,n}) = \gamma^{m_n - 2} \int_{\upsilon_{\min}}^{\upsilon_{i,n}} x \frac{f(x)}{1 - F(x)} dx$$

and $\upsilon_{i,n}$ is determined by equation (2.7).[9]

From equation (2.8) it is clear that the time any party is willing to spend on bargaining at any given stage of the game increases with the prize valuation and hence with the degree of ideological dispersion of coalition partners. That is, when coalitions are less ideologically homogeneous, the higher risk of having to bear a larger utility loss in case of defeat leads parties to bargain longer for any given value of the bargaining costs and of the supports of the distribution of types. The full bargaining cost κ has been normalised to 1 in equation (2.8). The optimal time of concession increases the larger the proportion of total bargaining costs which have to be paid, even after exiting the game and until only one survivor is left. Again, this result is hardly surprising. If exit does not allow the party to save much of the total costs of negotiations, then carry on bargaining is the utility maximising behaviour.

Let N be the total number of stages required to identify the last survivor (in a two-player game, N is equal to 1; in a three-player game N is equal to 2, and so on). Total cabinet formation is then given by the sum of N terms like (2.8):

$$(2.9)\ T = \sum_{n=1}^{N} \left(\gamma^{m_n - 2} \int_{\upsilon_{\min}}^{\upsilon_{i,n}} x \frac{f(x)}{1 - F(x)} dx \right)$$

Equation (2.9) incorporates a clear-cut prediction concerning the duration of cabinet formation in coalition systems. For any given size of the bargaining costs and number of players involved, the duration of the formation process increases the more ideologically heterogeneous the coalition is. This is an immediate consequence of the definition of the prize valuation in equation (2.7). When the contrast between the policy preferences of players is greater, obtaining control of the key portfolio becomes more important, optimal concession times get longer at any stage of the game and hence the overall duration of the process lengthens. It is worth stressing that formation delays arise in equilibrium even for small differences in the ideological locations of coalition

[9] Equation (2.8) is originally derived by Bulow and Klemperer (1997) for the multi-player generalised war of attrition with no uncertainty over player's types.

partners. That is, one does not need to imagine broad coalitions of very different parties for the result of the model to hold true. As noted by Scharpf (1997), coalitions are made of players with relatively similar interests, but these interests are not exactly identical. The model suggests that the less similar these interests are, the longer it will take for cabinet formation to be completed. Only when parties share exactly the same policy location (an event which is quite rare in the real world) the model predicts immediate agreement. In that case, in fact, there is no difference between the policy of the winner and the policy of the losers so that there is no incentive to fight the war of attrition.

In general, the implication of equation (2.9) is that any factor affecting prize valuation will also affect the duration of the formation process. From equation (2.7) it appears that in addition to the degree of ideological heterogeneity of coalition partners, the size of party-specific δ and the discount factor ρ will play a role. Harder-nosed parties have a higher valuation of the key portfolio for any given distribution of policy preferences; this generates a longer negotiation. Unfortunately, finding an empirical proxy for the intrinsic nature of parties is difficult, especially given the assumption that a party's nature and ideological location are selected independently. The discount factor ρ incorporates party's expectations on the duration in office of the cabinet. Intuitively, if a party believes that the forming cabinet will last for some time, then controlling the key portfolio of finance becomes more important for this party, since otherwise it will have to bear the disutility cost of the defeat for a longer time. It then follows that a longer expected cabinet duration should generate a longer cabinet formation.

Another prediction of the model is that negotiations will last longer the lower the total cost of bargaining (if not normalised to 1, the parameter κ would enter equation (2.8) raised to the negative power) and the higher the proportion of this cost which is borne by parties even after they decide to drop out of the competition. The basic rationale underlying this result has already been pointed out. Higher total bargaining costs implies that parties find it less convenient to delay formation for any level of their prize valuation. However, when a large proportion of these costs is paid until the end of the game independently of whether or not they are still competing, an incentive to carry on bargaining for additional time also exists. In other words, negotiations last longer when total bargaining costs are low and paid throughout the duration of the game even by parties that have already given up.

Finally, consider the impact on duration of increasing the number of players. The addition of a player implies that $N+1$ stages rather than N are required for the game to be solved. But this does not necessarily mean that the total duration of the cabinet

formation process increases. In fact, it all depends on how the inclusion of a new player alters the degree of dispersion of policy locations in the coalition. In particular, if the dispersion is reduced, then the final effect might well be shorter bargaining. However, if the inclusion of the new player does not significantly alter the degree of ideological heterogeneity, then the formation delay should lengthen.

2.2.3 Possible extensions of the model

The models of the previous two Subsections assume that bargaining takes place over just one key portfolio. Given the dominant role of the economic dimension and the importance attached by politicians to the portfolio of finance (or some other portfolio with jurisdiction over economic issues), this assumption does seem to be appropriate. However, the same logic of the model with one key portfolio could be extended to consider two or more key portfolios. One possible way to do this is by assuming that several wars of attrition occur at the same time, one for the control of each key portfolio. Then, the total duration of the cabinet formation process would be given by the duration of the longest war of attrition. To the extent that the nature of parties, the cost of bargaining, the number of players and their expectations concerning the future duration of the government are constant across different games, the longest would be the one in which coalition partners display the highest degree of dispersion of policy ideals. That is, suppose that parties in the coalition have similar preferences over economic issues, but rather different views over international affairs, then the duration of the cabinet formation process would be equal to the duration of negotiations over the allocation of the key portfolio of international affairs. A complication would arise if the outcome of one war affects party's incentives in the other still going on. In general, the key prediction that ideological heterogeneity makes negotiations longer should hold.

An alternative approach to the case of bargaining over more than one key portfolio would assume that a generalised game is played between K players over the allocation of $W > 1$ key portfolios. The key problem here would be how to define the policy preference parameter θ. The hypothesis that I find more attractive is to interpret θ_i as the aggregation of the ideal policies of party i on the various dimensions of the policy space (each dimension is assumed to be incorporated in a key portfolio) and θ^* as the aggregate policy output, implemented by a given set of winners (that is, of parties that end up in control of at least one key portfolio). This would still permit a formulation of the utility function of player i as in equation (2.4), with $\theta_i \neq \theta^*$ if party i does not control

a key portfolio. Then, under the further simplifying assumption that all parties value key portfolios equally and that any party can control at the most one key portfolio, the optimal concession time of party *i* at stage *n* would be implicitly defined by:

$$(2.10)\quad T'(\upsilon)=\gamma^{k-1}\upsilon W\frac{f(\upsilon)}{1-F(\upsilon)}$$

where *k* is the number of parties that still have to drop out before that the game is over; that is, *k* is equal to the number of losers *K-W* minus the number of observed exits *n-1* and the number of parties in the risk set at stage *n* is $W+k$.

To see where condition (2.10) comes from, simply consider that the corresponding condition for the case with just one portfolio is:

$$(2.11)\quad T'(\upsilon)=\gamma^{K-1}\upsilon\frac{f(\upsilon)}{1-F(\upsilon)}$$ [10]

The difference between the two cases is that with *W* key portfolios, party *i* minimises its post-formation disutility if it is one of the *W* last survivors (and not just *the* last survivor). The expected benefits from bargaining for an additional instant (i.e. from *t+dt*) is thus given by the prize valuation times the hazard rate times the number of winners *W*. The prize valuation υ in equation (2.11) could be defined along the lines of equation (2.7), with θ_j representing a generic policy outcome associated with a government where party *i* does not hold a key portfolio.

The major drawback of this second approach to the extension of the case to more than one key portfolio is that to make the model tractable some restrictive assumptions must be stated. In particular, the assumption that all parties value key portfolios equally and that any party can control at most one key portfolio implies that the real objective of parties is to be included in the set of *W* winners and that they do not really care about which of the *W* key portfolios they control. This is in conflict with the spirit of the portfolios allocation approach. An analogous objection can be advanced on the assumption that the aggregate policy of the government only depends on the identity of the winners and that it coincides with the aggregate ideal policy of party *i*, no matter

[10] In Subsection 2.2.2 condition (2.11) is incorporated in equation (2.8). Notice how both equation (2.10) and (2.11) are simple generalisations of the symmetric Nash equilibrium for the case of two parties and one key portfolio, equation (2.2).

which key portfolio party i controls (if party i is not in control of any key portfolio, then the aggregate policy of the government is correctly assumed to be different from the aggregate ideal policy of the party). Moreover, implicit in the above stated assumptions is the condition that bargaining is meaningful only if $K > W$. However, some stylised facts can be provided to support this latter restriction. The average number of coalition partners in western European coalition systems is larger than 3 (see data in Table 1.2 of Chapter 1), whilst Laver and Hunt (1992) report that for several countries the effective number of key portfolios is equal to 2 and for no country it is larger than 3.

A second possible extension of the model concerns the treatment of the expectations over the duration of the forming cabinet. I have assumed that such expectations are incorporated into the discount rate factor ρ and that this parameter is common knowledge and equal for all players. A more sophisticated possibility would be to specify a termination date and then compute the difference between victory and defeat as the present discounted value of a temporary (rather than permanent) series of payments. To the extent that all parties consider the same termination date, this would not alter the qualitative features of the model. One might believe that different parties have different expectations over the duration in office of the forming cabinet and that these expectations might be private information. In this case the prize valuation of generic party i would be determined by two party-specific factors: its nature δ_i and its expectation over cabinet survival. The possibility that prize valuation is not known by party i itself would however remain. Eventually, a party of "wet" nature could increase its chances of winning the game if it expects the government to last for a long time. However, one should also model how and why parties form different expectations. All in all, I believe that the common discount factor still provides an appropriate representation of the effect of expectations over cabinet duration.

More interesting would be the introduction of an explicit deadline for the bargaining process. Alesina and Drazen (1991) investigate this extension for the case of two players that always know their type. They stress the importance of the definition of a tie-breaking rule; that is, of a rule that establishes what happens once the deadline expires and the agreement has not been reached. In the case of bargaining over cabinet formation, two alternatives would appear feasible. First, a new formation attempt is undertaken by a different group of parties (although some of the parties in the old proto-coalition might be included in the new one). Second, the Head of the State calls new elections. It could be argued that parties might find both alternatives quite costly (as a consequence of low returnability in office and/or uncertainty about electoral outcomes,

for instance), so that an incentive to achieve an agreement before the deadline expires exists. Formally, one could imagine that the instantaneous cost of bargaining κ increases with time and so, once the deadline approaches, the optimal times of concession shorten. Different parties would evaluate the consequences of a failure differently (i.e. some might fear an electoral contest more than others), so that the speed at which the cost of bargaining increases is not the same for all players. One could complicate the framework by assuming that parties do not observe the rate of growth of the cost of bargaining of their opponents. Reputational considerations might be introduced: a party could have the incentive to behave as if its bargaining cost were growing slowly in order to force earlier concessions from the others. In any case, the prediction that bargaining lasts longer the more ideologically diverse the coalition partners are would still survive.

Several recent models in this area of the literature assume a utility function for the generic party *i* where a term is included to capture generic benefits from holding office (see, for instance, Diermeier and Merlo, 1998). These benefits are, however, interpreted as being enjoyed by all parties in the government, independently from the portfolios they hold. If this is indeed the case, then no extension of equation (2.4) would be required, since all players taking part in the war of attrition of Subsection 2.2.2 are already members of the ruling coalition. However, one might realistically believe that, in terms of visibilty and ability to appropriate patronage, control of a key portfolio is more valuable than control of non key portfolios. The, equation (2.4) could effectively be written as:

$$(2.12) \quad u_{i,t} = -\delta_i(\theta^* - \theta_i)^2 + \eta_i$$

where η_i is a positive party specific parameter that reflects distributive benefits received only by the party in control of the key portfolio.

Albeit conceptually valuable, this addition would not alter the key features of the model. In particular, notice that it would work in the sense of increasing the difference between victory and defeat for any value of the party specific policy focus δ_i. This implies that optimal concession times would on average lengthen, and hence that cabinet formation would take longer. Most of the predictions pointed out at the end of Subsection 2.2.2 would still hold.

In fact, the idea that distributive benefits exist for the party in control of the key portfolio in addition to policy-related benefits suggests an alternative interpretation for the party specific δ_i in equation (2.4). The role of this parameter is to weigh the disutility of not controlling a key portfolio. Assume that two losers in the war of attrition share the same ideal policy $\theta_i = \theta_j = \theta$. The policy implemented by the winner is $\theta^* = \theta_z$ so that for both losers the Euclidean gap in equation (2.4) is $(\theta^* - \theta)^2$. Suppose that for party *i* the appropriation of distributive benefits is more important and/or that it expects to extract a larger share of patronage from the control of key portfolio than party *j* does. Then, the disutility of defeat for party *i* is larger than for party *j* even if the Euclidean gap from the policy of the winner is the same. One could account for this different valuation of defeat by letting $\delta_i > \delta_j$. In this sense, the party specific δ would be taken to capture the party specific relevance of opportunistic incentives. Again, such an interpretation would be consistent with the formal characterisation of the equilibrium in Subsection 2.2.2.

Finally, the framework of Subsection 2.2.2 could be used to provide an account of early cabinet terminations. When deciding to give up, losers have already taken into account the adverse consequences of not being in control of the key portfolio of finance. However, the evolution of the political environment might present them with new opportunities in the form of alternative potentially viable coalitions of which they would become a member, thus giving them the chance to play the game again and win. Of course, breaking the existing agreement would determine a loss of credibility. Furthermore, part of the electorate might conceivably consider the party that terminates a government responsible for cabinet instability and hence punish it at next elections. But, to the extent that the expectations of winning the war of attrition in the new coalition are sufficiently high, any of the losers would have an incentive to terminate the incumbent cabinet even before its mandatory term has expired. Clearly, such an extension would mean developing a more ambitious model of cabinet duration rather than a simpler model of cabinet formation.

2.3 Predictions from two alternative forms of political bargaining

In the model of Section 2.2 parties bargain over the control of key portfolios. This view is a direct consequence of the set of assumptions described in Subsection 2.2.1 which characterise the social context of government formation according to the portfolios allocation approach. But as the survey of the literature in Section 2.1

discusses, scholars consider at least other two possible forms of bargaining. The first one builds on the tradition of Von Neumman and Morgenstern (1944) and identifies the object of bargaining with a fixed cake with a set number of pieces (i.e. the cabinet posts). The second one assumes that parties bargain directly over policy outcomes, so that the cabinet is formed as a common policy proposal on which parties in the ruling coalition agree. This policy agreement is specified in details and can be taken to represent a master-plan of the cabinet's action to be implemented automatically (see *inter alia* Baron 1991 and the discussion in Chapter 1 of Laver and Shepsle, 1996).

To undertake a systematic econometric analysis of a broad range of aspects of the cabinet formation process in western European coalition systems, in addition to those obtained from the model of war of attrition, I consider theoretical predictions obtained from two other bargaining models set in the tradition of the two alternative approaches just mentioned. Since these two additional models are adaptations of well known strategic forms of bargaining games to the specific case of political negotiations, I prefer to focus on the intuition underlying the key theoretical results. A more formal discussion of the models is provided in Appendix A2.3.

2.3.1 Cabinet formation as a problem of equilibrium allocation of a cake

Assume that parties in the ruling coalition regard the set of cabinet portfolios as a cake with a set number of pieces. Each party is interested in getting the largest possible share of this cake (i.e. the largest possible number of portfolios). Notice that this incentive does not necessarily imply that parties are purely electoralist. If the decision making process within the executive is effectively a collective action, then having a large number of representatives in the cabinet is a necessary condition for a policy motivated party to obtain a policy output as close as possible to its own ideal policy.

The problem of allocation of a cake is a well covered one in the game theoretic literature (see Osborne and Rubinstein, 1994 for an introductory discussion). Building on the structural framework proposed by Rubinstein (1985 a,b) I assume that bargaining proceeds as a game of alternating offers between a first mover formateur party and a coalition partner [11]. In the first stage of the game, the formateur makes an offer of a

[11] Rubinstein (1985 a,b) characterise equilibrium outcomes for the case of a two-party game. Binmore (1985) shows under which conditions equilibrium will exist for the three-player case. Following Lupia and Strom (1995) one could further generalise the set-up by assuming that one of the parties involved in negotiations is actually a proto-coalition. This expansion is problematic if the unitary actor hypothesis (which is empirically feasible for individual parties) does not carry over well in the case of a proto-coalition.

partition s of the cake (where s is the number of portfolios that the formateur would receive). If accepted by the other party, this offer is implemented and the cabinet formed. If not accepted, then a counter-offer is made in stage 2 by the other party. The game reiterates until a proposal is made by one of the two that is accepted by the other. Eventually an explicit deadline can be imposed. If it expires without an agreement having been reached, the formation attempt fails and either a new formateur is selected (and a new set of parties in the ruling coalition determined) or elections are called. Bargaining is costly. An instantaneous cost of bargaining c_i is specified for each of the two players and characterises their nature. More specifically, if c_i is high, then the party is said to be "wet". If c_i is low, then the party is said to be "hard-nosed".

In real world politics, the status of the formateur party in the formation process is indeed very peculiar. If the formation attempt is a success, then the formateur will play a central role in the life of the cabinet, often retaining the office of prime minister. If instead the formation attempt fails, then the formateur is likely to be held politically responsible for this failure and blamed more than other coalition partners. So, overall, it is well known to every actor in the game how important it is for the formateur to make the formation attempt successful. The same is not quite true for other coalition partners. Of course, they are likely to prefer a success to a failure, but exactly how much they prefer the former to the latter is unlikely to be clear to the formateur. To capture this aspect, I let the formateur be an uniformed player in a game with asymmetric information. More specifically, I assume that the size of the bargaining cost paid by the formateur is known to the other coalition partners, but not the reverse. In other words, the formateur does not know whether the other party is hard-nosed or wet.

In the Appendix A2.3 the sequential equlibria for this model with asymmetric information are completely characterised following the argument developed by Rubinstein (1985 a, b) concerning the choice of the conjectures formulated by the uninformed player. The central feature of these equilibria is that they admit delayed agreement and that the share received by the formateur is smaller when the game extends behind the first stage (that is, when agreement is delayed). Therefore, one prediction is that the number of portfolios controlled by the formateur is decreasing in the duration of negotiations. Intuitively, the rationale of this result is as follows. A long lasting negotiation is symptomatic of a particularly complex bargaining environment. Moreover, the longer the time spent on bargaining, the more likely that the Head of the State will decide to intervene, changing formateur or calling new elections. All this implies that as the process extends over time, the probability that the formation attempt

fails increases. Faced with this higher probability of failure, the formateur becomes more and more willing to concede control of a larger quota of portfolio to the partner(s) in order to facilitate agreement and avoid failure. A corollary of this argument is that the share of portfolios of the formateur should be negatively affected by all those factors that contribute to make the bargaining environment more complex. So, for example, a higher degree of ideological and numerical fragmentation of the coalition should reduce the equilibrium of cabinet posts secured by the formateur.

2.3.2 Cabinet formation as a problem of bargaining over policy proposals

Consider a uni-dimensional Left-Right ideological continuum. The ideal policy of generic party *i* is then represented by a cardinal location on that continuum and the government is formed when parties in the ruling coalition agree on a location that represents the policy to be implemented by the government. The objective of parties involved in the cabinet formation process is to negotiate a policy agreement located at the shortest possible Euclidean distance from their own ideal location on the uni-dimensional space. This is equivalent to saying that parties prefer policy outcomes which are closer to their ideal policy.

A possible way to represent this interaction is to let parties bargain over policy proposals just as sellers and buyers bargain over the price of an indivisible good to be traded. Then the framework of game theoretic models of bargaining in markets can be used to predict the outcome of negotiations over cabinet formation. Appendix A2.3 provides the formal details of such an interpretation. A prediction is generated concerning the relationship between duration of the bargaining process and *degree of balance* of the outcome of the process. In particular, this relationship should be non-linear and have the form of an inverted U. That is, balanced outcomes are those produced by either long or short negotiations, whilst negotiations of intermediate duration generate unbalanced outcomes.

Subsection 2.4.3 presents various empirical proxies to measure the extent to which the outcome of negotiations can be regarded as balanced. To fix ideas, consider a simple two-party coalition with parties located at some distance one from another on the ideological continuum. Let θ_i and θ_j be these two locations. Assume that $\theta_i > \theta_j$, so that party *i* can be labelled as right-wing and party *j* as left-wing. The policy agreement that characterises the government is represented by a location θ^* such that $\theta_i \geq \theta^* \geq \theta_j$. Thus, two Euclidean gaps are generated: one for party *i* (equal to $G_i = |\theta^* - \theta_i|$, where

the absolute value indicates Euclidean distance) and one for party *j* (equal to $G_j = |\theta^* - \theta_j|$). Then, the outcome of the bargaining process is to be considered as balanced if the absolute value of the difference between these two gaps is relatively small; that is, if $|G_i - G_j| \leq \varepsilon$, where $\varepsilon > 0$. A balanced outcome is therefore one that involves an overall similar amount of ideological concession from both parties.

Given this notion of balance, the basic prediction mentioned above can be understood in simple terms as follows. Parties can again be of either "hard-nosed" or "wet" nature. The difference is that the former makes little concessions at each stage of the game, whilst the latter makes faster concessions. To put it differently, after observing the initial gap, hard-nosed parties do not re-locate much in order to fill this gap. Wet parties are instead ready to give up more of their ideological identity in order to find a compromise with the partner. Suppose now that the two parties in the coalition are of the same type. Then, they will make concessions at the same rate and hence they will be likely to meet at about mid-way of the space with limits given by θ_i and θ_j. More specifically, if both parties are hard nosed, then it will take a long time for the two parties to reach a compromise. If instead they are both weak, the compromise will be reached quickly. In both cases, however, this compromise will be such that the difference between the two Euclidean gaps G_i and G_j is effectively small; that is, the outcome is balanced. But if one party is hard nosed and the other is wet, then concessions occur at a different rate. The policy agreement will be reached at a location significantly closer to the ideal point of the hard-nosed party. Moreover, the time required for the negotiation to be completed will be greater than in the case of a negotiation between two hard-nosed parties, but less than in the case of a negotiation between two wet ones. Thus, a negotiation of intermediate duration generates an unbalanced outcome.

2.4 Empirical analysis of cabinet formation in western European coalition systems.

In this Section, the theoretical predictions of the three models of bargaining previously discussed are empirically tested using the data-set presented in Chapter 1. The countries in the sample are the western European coalition systems: Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway and Sweden. As already noted, these are all countries characterised by a rather fragmented legislature (i.e. more than two parties hold

considerable shares of seats in the parliament) and in which the executive is normally represented by either single party minority governments or coalition governments. The basic features of the social context and the sequence of events of the government formation process also appear to be similar across countries in the sample. After elections (or after an early cabinet termination), the Head of the State usually asks a leading politician to conduct a series of preliminary talks to identify a possible set of coalition partners, or simply to verify the intention of various party leaders. Once this *informateur* has completed his task and reported to the Head of the State, formal negotiations start with the appointment of the formateur. Eventually, if the bulk of the proto-coalition is already well identified, the stage of the informateur can be skipped. The formateur discusses the formation of the cabinet with potential coalition partners. His formation attempt could be successful, in which case a list of ministers is presented to the Head of the State, or unsuccessful, in which case the formateur renounces to his mandate and either a new formateur is appointed or new elections are called. Cross-country differences are observed with respect to the institutional arrangements concerning the official investiture of the new cabinet. Most national constitutions state that the new cabinet formally enters office with the swearing-in ceremony of its ministers. However, in Belgium, Italy and Sweden (since the mid 70's), the cabinet is officially formed only after that its programme has been discussed in the parliament and a vote of confidence/investiture has been granted. In Ireland, the prime minister must receive an individual vote of investiture from the *Dail* (the Irish Lower House). Since these differences might affect the duration of the formation process, institutional dummy variables will be used in the duration analysis of Subsection 2.4.1.

The model of war of attrition of Section 2.3 yields predictions concerning the impact of political factors in general, and of the degree of intra-coalition ideological heterogeneity in particular, on the total length of negotiations. To test this prediction, a statistical model of duration of government formation is estimated in Subsection 2.4.1. The model of bargaining over the allocation of a cake generates the prediction that the share of the cake secured by the first-mover (the formateur) decreases as bargaining extends over time. A logistic regression analysis is undertaken in Subsection 2.4.2 to investigate the determinants of the number of cabinet posts received by the formateur party. Finally, the model of bargaining directly over policy outcomes suggests that a non linear relationship exists between the degree of balance of the outcome of the bargaining process and the length of the process itself. After defining an empirical

proxy for the degree of balance of the outcome of negotiations, Subsection 2.4.3 will estimate a Box-Cox regression model of its determinants.

2.4.1 Determinants of the duration of the bargaining process

In spite of the vast theoretical literature dealing with the issue of political bargaining and cabinet formation, empirical work on the determinants of the duration of cabinet formation is very limited. Merlo (1997) constructs a model where the time required to achieve an agreement over the allocation of a cake (whose size is proxied by the expected duration of the forming cabinet) is determined by a set of parameters reflecting the degree of impatience of players and the procedure for the selection of the formateur. He produces estimates of the parameters using data obtained from cabinet formation in Italy over the period 1948-1994, and then generates a density of predicted negotiation durations that is found to be not statistically different from the observed empirical density. Diermeier and Van Roozendaal (1998) apply *event history analysis* to investigate the determinants of formation duration in the western European coalition systems over the period 1945-1990. They consider the role of some institutional and environmental variables plus a few political factors pertaining to the degree of fragmentation and polarisation of the legislature (both fragmentation and polarisation are proxied by the corresponding indicators discussed in Chapter 1). They find that post-election formations are significantly longer than other formations (i.e. formations taking place after an early termination of a cabinet) and that in countries where the continuation rule applies (i.e. those countries where the incumbent government does not have to resign when new elections are held if its supporting coalition is a winner at the polls), bargaining is shorter. The caretaker status of the government is also found to significantly reduce the length of negotiations, whilst the existence of a formal investiture procedure does not seem to play any statistical significant role. Finally, neither the degree of fragmentation of the legislature nor the degree of polarisation are found to affect formation duration.

The analysis undertaken in this Section extends the contribution of Diermeier and Van Roozendaal (1998). I adopt their same statistical methodology (which is also useful for the analysis of cabinet stability performed in Chapter 3) but consider a longer time-period and a much broader set of explanatory variables. In particular, to test the model of war of attrition, I add an indicator of the degree of ideological heterogeneity of coalition partners. I also study the impact of the economic environment. If formation

delays represent a cost from the point of view of the society, because of the policy-making inaction they generate, then one could believe that a worsening of economic conditions does stimulate earlier agreements.

A further difference between my analysis and the one by Diermeier and Van Roozendaal (1998) concerns the criteria used to measure the duration of the formation process. Diermeier and Van Roozendaal take the resignation of the outgoing cabinet or the date of elections as the start of a new formation process. Instead, for consistency with the theoretical formulation of Sections 2.2 and 2.3, I take the date of appointment of the formateur (as reported by the Keesing' s Record of World Events) as the beginning of bargaining. That is, I start counting the duration of the process from the point in time at which it appears that a coalition is already identified.[12] This also implies that a variable such as the degree of ideological heterogeneity of coalition partners is not endogenous to duration over cabinet formation. With regard to the termination of the process, I adopt the same criterion of Diermeier and Van Roozendaal, namely that the formation process ends when the cabinet formally enters office. In turn, a cabinet formally enters office when ministers are sworn in by the Head of the State or, in countries where it is established by the Constitution, when the parliament gives its vote of investiture.[13] Average durations of the formation process in the countries of the sample are reported in Table 2.1 below.

country	*average duration (days)*	*country*	*average duration (days)*
Austria	36.888	Iceland	29.764
Belgium	39.142	Ireland	18
Denmark	8.888	Italy	37.957
Finland	26.6	Luxembourg	27.142
France	11.761	Netherlands	71
Germany	26	Norway	11.666
		Sweden	11.863

Table 2.1. *Average duration of bargaining over cabinet formation in western European coalition systems, 1950-1995.*

[12] It often happens that several formateurs fail before one is successful. In this case, if the proto-coalition is substantially unchanged across different attempts, then the duration of the process is measured, starting with the appointment of the first formateur.

[13] Daniel Diermeier made his data on formation duration available to me and I wish to thank him. However the above mentioned difference in the criteria used to identify the start of negotiations made me decide to construct my own series of data using the Keesing's Contemporary Archive, to which I had access at Glasgow University. The results I report and discuss are those obtained using my own data. However, I have re-estimated the model using Diermeier's data and I have found that several qualitative results still hold true.

2.4.1.a A statistical model for the analysis of duration data

Duration data in general, and cabinet formation duration data in particular, are by definition positive (the minimum duration in the sample is equal to 1 day). This implies that standard assumptions concerning the normality of the distribution do not hold and hence that the standard linear regression model is not an appropriate statistical tool. A possible alternative (see Greene, 1993) is the log-transformation of the duration data, although it builds on a rather restrictive distributional assumption.[14] A more suitable approach is that of *event history analysis* (see, for instance, Kalbfleisch and Prentice, 1980, for a detailed treatment of the theory and Kiefer, 1988 for a discussion of some economic applications). With this approach, first developed in medicine, biology and engineering, the history of a negotiation is represented as a stochastic process, whose duration can be affected by structural factors (i.e. various institutional arrangements, specific features of the coalition and/or the parliament, economic conditions). The basics of the statistical model and of the estimation method are described below.

Let the process of cabinet formation be characterised as a stochastic process X_t taking values in the discrete space $\{E_0, E_1\}$. At time $t = 0$ the process is in state E_0. Transition to state E_1 occurs only once, at time $t = T$. Thus, time $t = 0$ is the beginning of negotiations; that is, the time of appointment of the formateur. Time $t = T$ is instead the time when the cabinet formally enters office; that is the time of the swearing-in ceremony and/or of the formal vote of investiture. Then, the time spent in state E_0 is the duration of the formation process and it is in the nature of a positive random variable. The probability that the transition from E_0 to E_1 will be observed between time t and time $t+dt$ conditional on the process having already lasted until time t is the *hazard function* $\lambda(t)$:

$$(2.13) \quad \lambda(t) = \lim_{\Delta \to 0} \frac{P[t < T < t + \Delta \mid T \geq t]}{\Delta}$$

To account for the impact of structural factors, a statistical model for the hazard function defined in equation (2.13) can be constructed as follows:

$$(2.14) \quad \lambda(t;\mathbf{z}) = \exp(\mathbf{z}'\mathbf{b})\lambda_0(t)$$

[14] The log-transformation would also be inappropriate were the data subject to heavy right-censoring. However, this is not the case of formation duration data, as it will be discussed later.

Equation (2.14) is known as the *Proportional Hazards Model*; **z** is a set of explanatory variables (covariates) that measure structural factors, **b** is the set of parameters to be estimated and λ_0 (t) is the *baseline hazard function.* The baseline hazard is defined as the hazard function for a reference case such that $E(\mathbf{z}) = 0$.

Implicit in the model (2.14) is the assumption that structural factors have a proportional impact on the hazard function. Notice also that taking log on both sides of (2.14) and then differentiating with respect to **z** one obtains:

$$(2.15) \quad \frac{\partial \ln \lambda(t;\mathbf{z})}{\partial \mathbf{z}} = \mathbf{b}$$

According to (2.15), estimated coefficients in the Proportional Hazards Model can be given standard partial derivative interpretations: a one-unit change in a given explanatory variable has an estimated effect on the hazard function equal to the estimated coefficient raised to the exponential power. However, it must be stressed that since the hazard function represents the probability that the formation process will be completed, a *positive* estimated coefficient implies that *larger values* of an explanatory variable *reduce* the duration of negotiations.

To estimate model (2.14) one could choose a specific functional form for the baseline hazard function and then maximise the resulting Likelihood. However, the choice of a functional form for the baseline hazard would require information about the underlying distribution of duration data, which is not necessarily available. In the absence of such information, arbitrary or *ad hoc* choices should be made which might considerably reduce the validity of the results. Cox (1972 and 1975) proposes a flexible semi-parametric estimation method that does not require the specification of a function form for $\lambda_0(t)$. The method is based on the maximisation of the Partial Likelihood (PL) function. The procedure to construct the PL function is as follows. Suppose that observed durations are ordered in a sequence as $t_1 < t_2 < \ldots < t_j < \ldots < t_m$ and let $\mathbf{R}_j$ denote the risk-set at time t_j. The risk-set at time t_j includes all formations that are not yet terminated at t_j; that is, all formations longer than (or eventually equal to t_j). The conditional probability that a formation in $\mathbf{R}_j$ is completed exactly at time t_j is equal to:

$$(2.16)\quad \frac{\lambda(t_j;\mathbf{z}_j)}{\sum_{k\in\mathbf{R}_j}\lambda(t_j;\mathbf{z}_{(k)})}=\frac{\exp(\mathbf{z}_j'\mathbf{b})}{\sum_{k\in\mathbf{R}_j}\exp(\mathbf{z}_{(k)}'\mathbf{b})}$$

where $\mathbf{z}_j$ is the value of $\mathbf{z}$ for the cabinet whose formation process terminates at t_j and $\mathbf{z}_{(k)}$ is the value of $\mathbf{z}$ for the generic cabinet k in the risk-set $\mathbf{R}_j$.

Equation (2.16) represents the contribution of each observation to the likelihood function. In addition to that, a full likelihood should include the contribution stemming from the observation that between t_j and t_{j+1} no formation has been completed. That is, information for the estimation of the parameter vector $\mathbf{b}$ should be inferred not only from the observed sequence of times $t_1, t_2, \ldots t_j \ldots t_m$, but also from the fact that none of the negotiations in the sample is successfully terminated in the interval $[t_j, t_{j+1})$. However, because the baseline hazard function is left completely arbitrary, one can assume that it takes a value very close to zero in that interval $[t_j, t_{j+1})$, so that no additional contribution to the likelihood needs to be registered. The likelihood is thus formed by taking the product over all formations in the sample of a series of terms like (2.16) and does not include contributions from the observation that no negotiation is completed between any two durations t_j and t_{j+1}. It is therefore in the nature of a Partial (as opposed to Full) Likelihood function:

$$(2.17)\quad L(\mathbf{b})=\prod_{j=1}^{m}\left(\frac{\exp(\mathbf{z}_j'\mathbf{b})}{\sum_{k\in\mathbf{R}_j}\exp(\mathbf{z}_{(k)}'\mathbf{b})}\right)$$

Maximisation of equation (2.17) often requires the use of an iterative procedure. The one I adopt is the Newton-Raphson method based on the score vector (see Greene, 1993, for an introductory discussion). Cox (1975) shows that under a broad set of conditions, usual properties of maximum likelihood estimators extend to maximum partial likelihood estimators.

One problem which is often encountered in the econometric analysis of duration data is the one of right-censoring of some observations. In general terms, right-censoring occurs if for a process of effective duration t, a duration $c < t$ is recorded. So, consider observed durations for all successful and unsuccessful formation attempts. Among the unsuccessful attempts, there will be at least some that were terminated by intervention of the Head of the State, who will have decided to re-start the process with

a new formateur or to call new elections. That is, the time of the termination of these negotiations was exogenously imposed: in the absence of the intervention of the Head of the State, negotiations would have lasted longer and hence a longer duration would have been observed. Data concerning these negotiations would therefore be right-censored.

Right-censoring can be accomodated within the Partial Likelihood framework to the extent that the censoring mechanism is non-informative (i.e. such that the only information incorporated in a censored observation is that the real duration of the process is longer than the censoring time) and independent from the mechanism that determines the natural termination of the process. Under these circumstances, the contribution of an observation censored between t_j and t_{j+1} would appear in the summation at the denominator of equation (2.16) for observations from t_1 to t_j only and never at the numerator (see Kiefer, 1988). In any case, the duration data used for the analysis of this Section are all non-censored. In fact, as previously mentioned, the sample includes only processes that resulted in a success. These process were thus "endogenously" terminated with the definition of an equilibrium agreement and the formation of a new cabinet that stayed in office for some time.

One final technical issue concerns the treatment of possible *ties* in the data. Suppose that v_j formations (with $v_j \geq 2$) are completed at the same time t_j. Then, the PL function (2.17) must be re-written to include a contribution for each of the tied observations, using the same denominator for each:

$$(2.18) \quad L(\mathbf{b}) = \prod_{j=1}^{m} \left(\frac{\exp(\mathbf{s}_j \mathbf{b})}{\sum_k \exp(\mathbf{s}_{(k)} \mathbf{b})} \right)$$

where $\mathbf{s}_j$ is the sum of $\mathbf{z}$ over all the v_j formations completed at time t_j and the summation at the denominator is taken over $k \in \mathbf{R}_{j,lj}$.

2.4.1.b Model specification

The key testable prediction of the model of war of attrition presented in Section 2.2 is that formation duration is increasing along with the degree of ideological heterogeneity of coalition partners. Thus, an indicator of the dispersion of the ideal policy positions of the various parties in the ruling coalition must be included in the set

of covariates **z** in equation (2.14). According to the theory, the estimated coefficient on this proxy should display a statistically significant, negative coefficient.[15] The variable *conflict of interest* (CI) is used to account for ideological heterogeneity. In order to give an empirical representation which is consistent with the theoretical argument incorporated in equation (2.7), CI is constructed as the variance of the cardinal locations of coalition partner on a ten point Left-Right ideological scale (such scales are described in the Appendix A1.1 to Chapter 1). Furthermore, three alternatives definitions of CI have also been used, all based on the Euclidean distance of individual parties' policy positions from a weighted average of policy locations, and the econometric results do not substantially change. Technical details of the CI variables are given in Appendix A2.4.

The war of attrition also predicts that for any given degree of ideological heterogeneity of coalition partners, the length of negotiations positively correlates to the expected duration of the forming cabinet. *Ceteris paribus*, a cabinet formed at the beginning of a legislature has a longer expected duration than a cabinet formed later in the same legislature since it has a longer time horizon to next scheduled elections. This suggests testing the above prediction including in the set of covariates **z** a dummy variable *first cabinet in the legislature* (FIRST) that takes value 1 for cabinets formed immediately after an election. Alternatively, the *time horizon to next mandatory elections* (TH) could be used. Again, the theory-based expectation is that FIRST (TH) should display a negative estimated coefficient.[16]

In addition to CI and FIRST, the vector of covariates **z** must include a set of control variables. These are needed in order to isolate other factors that might affect the duration of negotiations. Without the inclusion of these controls, results on the two variables CI and FIRST could not be taken as conclusive. Extending the model specification proposed by Diermeier and Van Roozendaal (1998) I include a set of dummy variables to account for the political background of the coalition and the cabinet as well as institutional differences. The dummy *continuation rule* (CONT) is coded 1 for the countries where the continuation rule applies and 0 otherwise. This rule states

[15] Notice, a negative coefficient implies that higher values of the proxy for ideological heterogeneity reduces the conditional probability of termination of the process and hence increases the duration of the process itself.

[16] The model also generates a prediction in terms of the relation between costs of bargaining and duration of the process. The problem in testing such prediction is that it is difficult to define a proxy for the cost of bargaining. However, some indirect evidence is obtained from the estimation of the coefficients on some of the control variables (see below). Future work in this area should be certainly aimed at further investigating this point.

that the incumbent governments may continue in office without having to resign even if an election is held. Of course, this continuation is possible if the ruling coalition scored a successful performance at the polls. The existence of such a rule clearly shortens the length of negotiations and hence the estimated coefficient on CONT should be positive. The dummy *caretaker status* (CARE) takes value 1 when the cabinet is a caretaker and 0 otherwise. Caretakers are often formed to bridge a relatively small period of time in the run up to elections and their powers are limited to the ordinary administration. In this sense, they are politically less interesting to parties, which are therefore likely to be unwilling to spend too much time on negotiations. Therefore, bargaining should last less when taking place in a caretaker situation: the coefficient on the variable CARE should thus be positive. The dummy *coalition continuation* (COALC) is equal to 1 if bargaining over the formation of the new cabinet involves the same set of actors that supported the outgoing cabinet and zero otherwise. Parties that have already successfully negotiated with each other should be less uncertain about individual preferences and strategic behaviour. In turn, this greater knowledge should facilitate agreement, so that a positive coefficient is expected on COALC. Uncertainty about party leaders preferences and strategic choices is certainly a potential cause of delayed agreements. When the previous cabinet has been defeated for political reasons, such uncertainty is likely to manifest itself as a consequence of intra-party leadership battles. To partially capture this effect, I use a dummy *reason for termination* (RFT). RFT makes use of the information in Woldendorp et al (1998) to isolate formations that follow a politically generated cabinet termination (i.e. when the previous cabinet terminated because of illness of the prime minister or mandatory scheduled elections, RFT is coded as zero). RFT should reduce the hazard and hence display a negative coefficient.

The model specification is also designed to control for some basic features of the party systems. Two easily interpretable indicators are the *degree of polarisation* (POL) and the *effective number of parties* (FRA). The former is the share of votes received by extremist parties. The latter is the inverse of the sum of squared shares of seats held by parties with parliamentary representation. They account for the ideological and numerical fragmentation of the legislature and contribute to define the complexity of the bargaining environment. Although not all parties with parliamentary representation are directly involved in negotiations over cabinet formation (for instance, extremist parties are usually regarded as non coalitionable), the strategic choices of those players who do actually bargain could be affected by the distribution of political preferences (as

reflected by POL) in the legislature and/or by the existence of alternative viable proto-coalitions (as reflected by FRA). On the grounds that negotiations should last longer as the bargaining environment becomes more complex, POL and FRA are expected to display negative coefficients.

The central idea incorporated in the model of war of attrition is that parties bargain over the allocation of key portfolios. However, the formal definition of the list of ministers to be presented to the Head of the State requires the complementary distribution of non key portfolios. Technically, if a larger number of portfolios must be re-allocated compared to the previous cabinet, then the duration of the formation process, measured as the spell between appointment of the formateur and swearing-in ceremony of the ministers, increases. Thus, I control for the number of total portfolio transfers through the variables *total portfolios volatility* (TPV) and *ideological portfolios volatility* (IPV). A negative coefficient should be estimated for both.

Returnability in office is an additional factor that might contribute to the speed of negotiations. Delaying agreement is costly from the point of view of parties because the Head of the State could decide to intervene and re-start the process with the appointment of a new formateur or calling new elections. If in a country the composition of the ruling coalition is historically volatile, then failing to form the government might imply for any party in the ruling coalition a low probability of returning to office in the near future. In other words, a good opportunity to win office would be missed. In this sense, returnability would work, at least to some extent, as an inverse proxy for the size of bargaining costs. I measure returnability by the degree of *alternation in office* (ALT). Defined as the share of seats held by parties leaving the executive plus the share of seats held by parties entering the government, ALT is in fact decreasing in returnability and hence its expected coefficient should be positive

Although it is not explicitly considered in the model of war of attrition, the role of the formateur in bargaining over cabinet formation is likely to be important. The formateur is in charge of conducting negotiations and, in the framework of a model of allocation of the cake, it makes the first proposal. A formateur in a particularly strong bargaining position could hence be in a position to force earlier agreements, consistent with his incentive to maximise the probability of success of the formation attempt. I control for this effect through the dummy variable *strong formateur* (DSTRONG) which takes value 1 if the formateur is both the median party and the largest in the parliament. That is, with the variable DSTRONG, the strength of the bargaining

position is related to both the ideological location of the formateur *vis-à-vis* the location of the other parties, and to his relative parliamentary size.

Finally, vector **z** will include a set of economic variables. A theory that explicitly links the state of the economy to the duration of the bargaining process has not been proposed in the literature yet. The issue can be addressed in a framework à la Diermeier and Merlo (1998): economic conditions affect the share of the cake to be allocated to coalition partners and this in turn affects their decisions to accept or reject the proposals of the formateur. In the model of war of attrition of Section 2.2 one can argue that costs of bargaining increase as the state of the economy worsens during the period of negotiations. Henceforth, bargaining should last less when economic conditions deteriorate. In more general terms, the intuition is that the economic environment might be a determinant of the duration of negotiations. The lack of an explicit theoretical model implies that the choice of the indicators to represent such economic environment is arbitrary. I choose to use three basic indicators: the index of industrial production (IP), the index of consumer price (CP) and the index of exchange rate (ER). The rationale behind this choice is that these indicators are relatively easy to interpret and hence voters and politicians are most likely to refer to them when forming an opinion about the state of the economy. For each of the three indices, the average rate of change over the period of negotiations is computed. In addition to that, lagged values of these rates of change are included in vector **z**. Again, the idea is that if economic conditions have been particularly poor over the last few months before the start of negotiations, pressure might be put on parties to achieve a quick agreement.[17]

2.4.1.c Econometric results

Table A2.1 in Appendix A2.1 reports the results from the estimation of model (2.7), with the vector **z** specified as just discussed in Paragraph 2.4.1.b. In addition to the estimated coefficients (with associated standard errors reported in brackets), the number of observations, the Log-rank test statistics (with associated p-values reported in brackets) and the value of the Likelihood function are displayed at the bottom of the table. The Log-rank test is a version of the Lagrange Multiplier test of a null hypothesis

[17] The lagged value of the rate of change of any of the three indices is computed as the average rate of change of that index over the n months before the start of negotiations. Ideally, rather than referring to the index of industrial production, one would rather refer to the rate of unemployment. Unfortunately, monthly time series of the rate of unemployment in all the western European countries are not available from the IMF (or even the OECD) for the full sample period. I thus revert to the index of industrial production, which is correlated to the rate of unemployment.

stated as H_0: $\mathbf{b} = 0$. Low p-values (that is, high values of the test statistic) imply that the null can be rejected and signal an overall good fit of the model. The lag on the economic variables is three months; results obtained when changing the lag structure are discussed in the next Paragraph. The sample includes all successful cabinet formations observed in the western European countries between 1950 and 1995.

In Column 1 a purely politico-institutional model of duration of the formation process is estimated. The variable CI displays the expected negative coefficient. Furthermore, the relatively low standard error implies that the hypothesis of a zero restriction on that coefficient can be rejected at usual confidence levels. Thus, the key prediction from the theoretical model of war of attrition is supported by the empirical evidence: even after controlling for a broad set of other factors, a wider ideological heterogeneity of coalition partners makes negotiations longer. Also consistent with the theory is the finding that negotiations last longer when the forming cabinet is the first of a new legislature and hence its time horizon is ceteris paribus longer (negative and statistically significant coefficient on the variable FIRST).

Of the set of political and institutional control variables, CONT and TPV are the two whose estimated coefficients are statistically different from zero. In both cases, the sign of the coefficient is consistent with a-priori expectations. In particular, formation takes longer when the continuation rule does not apply and when a larger number of changes in the structure of portfolio allocation must be defined before the list of ministers is handed to the Head of the State.

In Column 2, economic variables are entered on the r.h.s. in addition to the political and institutional ones. It must be noticed that as a consequence of the limited availability of monthly economic time-series, the number of observations used for the estimation of the model drops to 228. In spite of this significant reduction in the size of the sample, most of the results concerning the political and institutional variables hold true. Above all, the coefficient on CI is still negative and significant, as well as the one on FIRST. The only key difference pertains to the coefficient on INV, which is now statistically different from zero. Thus, based on the smaller sample, cross-country differences in the institutional arrangements concerning the formal investiture procedure do matter for the duration of the cabinet formation process.

Turning to economic variables, it appears that only the rate of change of the exchange rate index (ERG) both contemporaneous and lagged, and the contemporaneous rate of change of the industrial production index (IPG) display significant coefficients. A first tentative interpretation of the pattern of estimated

coefficients on these indicators could be as follows. Lower growth of industrial production is certainly an indicator of worsening economic conditions. The negative coefficient on IPG thus suggests that formation is faster as economic conditions deteriorate. A depreciation of national currency might also be perceived as positive for the economy since it fosters exports, at least to the extent that it does not engine excessive inflation. The negative coefficient on ERG and ERG-lagged would therefore be consistent with the idea that negative economic conditions accelerate the process of cabinet formation. As already noted, more theoretical work on the link between the state of the economy and the duration of negotiations might be an interesting avenue for future research. Nevertheless, the point to stress is that the findings concerning the political variables (and the variable CI in particular, which is central to the test of the prediction obtained from the model of war of attrition) survive the inclusion of economic variables.

The last piece of evidence is produced in Figure 2.1 below. This is a plot of the integrated hazard function $\Lambda(t)$ against duration (in weeks) of the formation process. The integrated hazard is simply defined as:

$$(2.19) \quad \Lambda(t) = \int_0^t \lambda(u)du$$

From its curvature it is possible to characterise the process of cabinet formation in terms of its *duration dependence*. More specifically, if the integrated hazard is convex, then hazard rates are increasing with duration and hence the probability that the process is terminated increases with the time spent on bargaining. In other words, with a convex hazard function, cabinet formation is characterised by *positive* duration dependence. If instead the hazard is concave, then the process is characterised by *negative duration dependence* in the sense that the probability that it will terminate in the near future decreases as the time already spent on bargaining increases.

Plot A in Figure 2.1 refers to the estimated integrated hazard from the purely politico-institutional model of Column 1 in Table A2.1. Plot B is instead the estimated integrated hazard from the politico-economic model of Column 2 in Table A2.1. As it is clear in both cases, the integrated hazard is convex, thus the process displays positive duration dependence: the longer the time parties have already spent on bargaining, the higher the probability that an agreement will be reached soon.

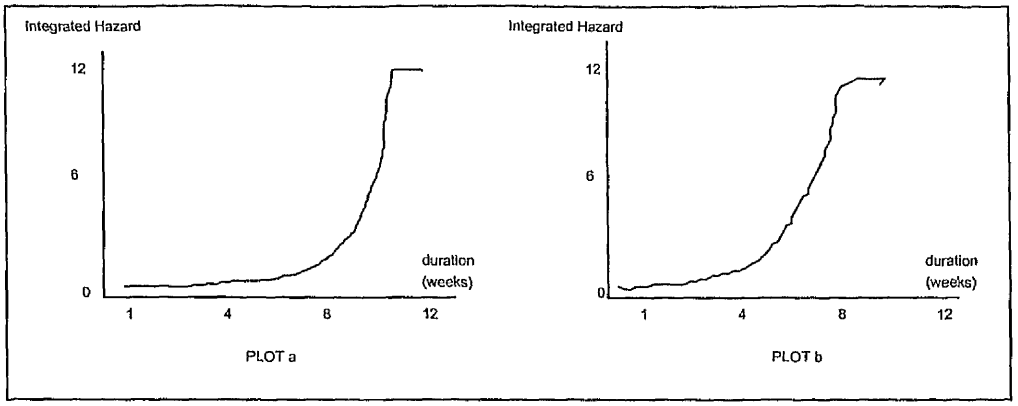

Figure 2.1. *Plots of the integrated hazard function for the models of duration of the cabinet formation process*. Panel A refers to the politico-institutional model; Panel B to the combined model.

2.4.1.d Model adequacy and sensitivity analysis

The Log-rank test statistics reported at the bottom of Table A2.1 already suggest an overall good degree of model adequacy. As an additional check, I have split the sample into groups based on values of the explanatory variables and re-estimated the two model specifications for each group. The new set of estimates thus obtained are qualitatively identical to those displayed in Table A2.1.

Sensitivity analysis of the results is also performed by altering the specification of the r.h.s. (that is, the composition of the vector **z**). Changing the lag of economic variables does not alter any of the results on the political and institutional variables. The significance of the coefficient on the ERG-lagged disappears when considering a four month (or longer) lag. The rate of change of the consumer price index always displays an estimated coefficient not statistically different from zero.

The results displayed in the Table are those obtained when the index of ideological fragmentation CI is defined as the variance of the policy positions of coalition partners on the Left-Right continuum. To take into account the different size of parties, alternative measures of ideological dispersions can be computed (see details in Appendix A2.4). However, no relevant qualitative changes are obtained when any of these alternative definitions of CI are used. In addition, when the variable CI is replaced by an indicator of numerical (rather than ideological) fragmentation of the coalition (i.e. the *effective number of parties in the coalition*), the estimated coefficient remains negative, but its standard error gets larger (thus reducing the degree of significance of the estimated coefficient). An analogous result is obtained when the *absolute number of parties* (ANP) is used instead of CI. The theoretical model of war of attrition does predict that for any given degree of dispersion of the ideological position of coalition

partners, the addition of another player should increase duration. When the absolute number of parties and the variable CI are added jointly to the model specification, they both retain a negative estimated coefficient, but standard errors again increase, possibly as a consequence of the positive correlation between the two variables. However, whilst the coefficient on ANP becomes insignificant at usual confidence levels, the one on CI still passes the zero restriction test.

The findings on the variable FIRST could have a twofold interpretation. Its negative estimated coefficient could reflect the longer time horizon of the forming cabinet (as I suggest in Paragraphs 2.4.1.b) or the higher degree of uncertainty that characterises post-election formations (as suggested by Diermeier and Van Roozendaal, 1998). To try and overcome this ambiguity, I have re-estimated the model using the variable *time horizon* (TH), expressed as the number of potential days in office at the time negotiations start, in addition to FIRST. Now, the time horizon effect should be accounted for by TH, with FIRST mostly reflecting the uncertainty effect. The problem is that the two variables are likely to be collinear. However, both display negative and significant coefficients, thus providing support to both hypotheses: the formation of the first cabinet of a new legislature takes longer because of the higher degree of uncertainty that follows an electoral contest (changes in the composition of the parliament, turnover of party leaders, etc.) and because of the longer expected duration of the forming cabinet.

I have also tried to represent the expectations over cabinet duration in a slightly more sophisticated way. Using the results of the analysis in Chapter 3, I identified four conditions that should ensure longer government survival and whose existence can be verified by all parties at the time of negotiations. Then I constructed four dummies, each based on the number of conditions which are met for any formation attempt. So, for instance, the dummy ESURV4 is coded one when all the four conditions are met and zero otherwise. The dummy ESURV3 is coded one when three conditions are met and zero otherwise, and so on. Then I added these dummies to the r.h.s. of the econometric model (dropping FIRST and TH) and found that ESURV4 and ESURV3 do display estimated negative and significant coefficients. Since these two dummies are those that should proxy for longest expected durations, this result is consistent with the hypothesis that parties bargain for a longer time when they believe that the forming cabinet will remain in office for a longer period.[18]

[18] The four conditions I consider are(a) majority status of the coalition, (b) degree of polarisation of the legislature larger than country average, (c)effective number of parties in the coalition larger than country

2.4.2. The determinants of the share of portfolios received by the formateur party.

In a model where cabinet formation is formalised as a problem of bargaining over the allocation of a cake, the equilibrium share of cabinet posts received by the formateur party is decreasing in the length of negotiations (see Subsection 2.3.1 and Appendix A2.3). To test the empirical relevance of this theoretical result one needs to investigate whether the duration of the formation process would display a negative and statistically significant coefficient in a regression of the share of portfolios held by the formateur, after controlling for other political and institutional determinants of the formateur' s share.

Theoretical work on political coalitions dating back to Gamson (1961) suggests that the share of portfolios received by any coalition partner (and hence also by the formateur) must be proportional on a one-to-one basis to that partner's share of coalition seats. The evidence produced by Laver and Schofield (1990) suggests that albeit high and positive, the correlation between the relative parliamentary size of a party and its share of portfolios is not perfect. This conclusion is reinforced by the results obtained from a simple OLS regression of the share of portfolios secured by the formateur (SHP) on a constant term and the formateur' s share of coalition seats (SHS). Based on a sample of 181 formations[19] in the western European coalition systems between 1950 and 1995, the OLS estimated coefficient on SHS is .97359 (s.e. .050045) and the constant term is .080256 (s.e. .027019). The linear restriction that the coefficient on SHS is equal to 1 and that the intercept is equal to 0 (as should be the case according to Gamson' s proposition) can be rejected at usual confidence levels (the Wald test-statistic being 50.7584 with an associated p-value of .000). Thus, the share of coalition seats is certainly an important determinant of the share of portfolios, but it is unlikely to be the only statistically relevant one. Other factors might play a role and one of them could be the duration of the formation process. The analysis that follows will shed some light on this point.

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average, (d) first cabinet formed of a new legislature. Notice that (a) and (c) are observable only to the extent that the coalition is already identified when negotiations start, as it should be the case when the beginning of the formation process coincides with the appointment of the formateur.

[19] In the analysis of this Subsection I only focus on coalition cabinets.

2.4.2.a Econometric framework and model specification

The dependent variable of the analysis to be undertaken is the *share of portfolios received by the formateur* (SHP). By definition, this variable is in the nature of a proportion and hence bounded between 0 and 1. This implies that standard assumptions concerning the normality of distribution are violated and that simple OLS estimators are not appropriate. In the applied literature, proportion data are normally within the framework of the *logistic regression model* (Amemyia, 1986; Greene, 1993).

Let s_i be the share of portfolios obtained by the formateur in the generic cabinet i and assume that n_i is the total number of portfolios of which cabinet i consists. A vector $\mathbf{x}_i$ contains the set of political and economic variables that might affect s_i. So, the logistic regression model I estimate is expressed as:

$$(2.20) \quad s_i = F(\mathbf{b}'\mathbf{x}_i) + \varepsilon_i$$

where $E[\varepsilon_i] = 0$; $Var[\varepsilon_i] = \frac{F_i(1-F_i)}{n_i}$; $F(b'x_i) = \frac{\exp(\mathbf{b}'\mathbf{x}_i)}{1+\exp(\mathbf{b}'\mathbf{x}_i)}$ and $\mathbf{b}$ is the set of coefficients to be estimated.

Notice that the regression model (2.20) implies heteroscedasticity and therefore the appropriate estimator is some form of Feasible Generalised Least Squares. Following Hosmer and Lemeshow (1989), a Weighted Least Squares (WLS) estimator based on a two-step procedure can be defined which is consistent and asymptotically distributed. In the first step of such procedure, OLS is run on the original model to obtain consistent, but inefficient, estimates of $\mathbf{b}$. These are then used to compute:

$$(2.21) \quad \hat{\Omega} = \frac{\exp \hat{\mathbf{b}}_{OLS}'\mathbf{x}_i}{1+\exp \hat{\mathbf{b}}_{OLS}'\mathbf{x}_i}$$

which is in turn taken to be the consistent estimator of Ω_i in the definition of the weight:

$$(2.22) \quad w_i = [n_i\Omega_i(1-\Omega_i)]^{1/2}$$

The weight (2.22) is then used to transform the original model and in the second step of the procedure, OLS are applied to the transformed model to obtain the WLS

estimates of **b**. Amemyia (1986) suggests an alternative Maximum Likelihood (ML) estimator which is shown to have the same properties of the WLS estimator. In presenting the results, I report both the WLS and the ML estimators. In addition to that, and just as a point of comparison, OLS estimates will also be reported.[20]

Vector $\mathbf{x}_i$ will include the *duration of the formation process* (FORM), expressed in log of the total number of days of negotiations, plus a set of controls. These will account for the two key factors which are likely to affect the share of the formateur: the strength of his bargaining position and the complexity of the bargaining environment. A stronger bargaining position will allow the formateur to obtain a more favourable agreement. Since most of the literature relates strength to parliamentary size, I capture this effect through two variables: the *share of coalition seats of the formateur* (SHS) and a dummy variable *large formateur* (DLARGE). This latter is coded 1 if the formateur is the largest in the coalition. However, as the models with centripetal tendencies mentioned in Section 2.1 claim, strength might depend not just on size, but also on the relative ideological location of the formateur. Therefore, the dummy *strong formateur* (DSTRONG) is also added to capture the case of a formateur which is at the same time the largest in the coalition and includes the median legislator. The expectation is that the estimated coefficient on all these three variables will be positive.

A more complex bargaining environment is, instead, associated with a smaller share of the formateur. In fact, as complexity increases, the risk of a failure goes up. Faced with this higher risk, the formateur is willing to give up some portfolios in order to facilitate agreement. This effect to some extent contributes to the result that longer negotiations are associated to a smaller share of the formateur (indeed, long negotiations are likely to be interpreted by the formateur as a signal that an agreement is difficult to achieve and hence that the process might well fail). Direct indicators of the complexity of the bargaining environment are the *degree of ideological heterogeneity of coalition partners* (CI) and *the effective number of parties in the coalition* (ENP); that is, the two measures of ideological and numerical fragmentation. I also make use of the *absolute number of parties* (ANP) and of the *real number of parties* (RNP) as potential proxies for fragmentation. The variable RNP is defined as the number of key portfolios to be allocated divided by ANP. Its rationale is that, although they are interested in

[20] Model (2.20) is based on a logistic transformation of the dependent variable which is not defined if that variable ever takes value 0 or 1. The standard approach in that case is to add or subtract a small positive constant from the dependent variable before transforming it. However, in the specific case of the analysis of the determinants of the share of portfolios of the formateur the problem does not arise. As a matter of fact, SHP is never equal to 0 or 1; that is, the formateur always receives at least one portfolio and never receives all portfolios (this is because only coalition cabinets are included in the sample).

maximising their shares of portfolios, parties could value key portfolios more than non-key portfolios. Thus, each party would try to obtain control of at least one key portfolio. The smaller the number of available key portfolios relative to the number of players, the more problematic the agreement over the partition of the cake. The sign of the estimated coefficient on all these indicators of complexity is expected to be negative (higher complexity reduces formateur' s slice).

The variables CI, ENP, ANP and RNP reflect the complexity of the bargaining environment resulting from specific features of the proto-coalition (and for this reason I define them as "direct" indicators of complexity). However, complexity might also result from the general political background within which negotiations take place. I thus use also "indirect" indicators of complexity: the *polarisation* of the party system (POL), the *effective number of parties in the legislature* (FRA), the *previous defeat of the formateur* for political reasons (DEF) and the *caretaker status* of the forming cabinet (CARE). Since higher values of POL and FRA should make the environment more complex, the expectation is that their estimated coefficients are negative. The same is true for DEF. This dummy takes value 1 if the previous cabinet was terminated for political reasons and the formateur held the office of prime minister in that cabinet. Thus it accounts for a situation in which the political position of the formateur is likely to be weaker. Instead, for CARE the expectation is for a positive coefficient. This is because of the particular role assigned to caretaker governments. As previously mentioned, they are formed for a limited period of time right before a new electoral contest. Their limited agenda implies that parties, possibly already engaged in the campaign, do not put too much effort into negotiations. In this sense, the first offer of the formateur is most likely to be accepted. This should reduce the duration of the formation and make the share of the formateur larger.

Finally, based on the argument that the state of the economy is likely to affect the strategic behaviour of agents involved in negotiations, the vector $\mathbf{x}_i$ will also include the rate of change of the economic indices, both contemporaneous and lagged. Sensitivity analysis is also performed to check the robustness of econometric results to changes in the specification of the model.

2.4.2.b Econometric results and sensitivity analysis

The results from the estimation of the logistic regression model (2.20) are reported in Table A2.2 in Appendix A2.1. The sample includes only cabinets supported by a

coalition of parties, for a total of 181 observations. As before, first I estimate a purely politico-institutional model. Notice that all coefficients statistically significant at usual confidence levels (1%, 5% and 10%) are consistent with a priori expectations. Both the strength of the bargaining position and the complexity of the bargaining environment affect the share of portfolios received by the formateur. A larger and ideologically median formateur (as reflected by the variables SHS, DSTRONG and DLARGE) is effectively able to extract a better deal from his partners. At the same time, in a more fragmented environment (as reflected by CI, ENP and, inversely, by CARE), the higher risk of failure determines an incentive for the formateur to concede control of some portfolios in order to facilitate agreement. Interestingly, most "indirect" indicators of complexity (POL, FRA and DEF) do not have any significant explanatory power.

The only really surprising finding is the one of a positive coefficient on RNP. On the one hand, one would be tempted to dismiss this result as a simple anomaly. On the other, a possible (albeit rather contrived) explanation could be advanced along the following lines. Suppose that a more or less explicit mechanism exists to compensate parties that do not enter in control of key portfolios. The reason for such a mechanism to exist is that although parties bargain over the allocation of all portfolios, they still value key portfolios slightly more than others. A low RNP means that the number of available key portfolios is low, relative to the number of potential coalition partners. This makes negotiations more difficult and increases the risk of a failure of the process. To facilitate agreement, the formateur could be willing to give up his demand to control one (or more) key portfolios and then benefit from the compensation mechanism. In other words, as RNP increases, the formateur trades off the control of one key portfolio against the control of a larger number of non key portfolios. Its overall share of portfolios would thus go up. Of course, this is just a tentative explanation. Additional theoretical and empirical work would be required to justify the assumptions on which it is based and, in particular, the idea that a compensation mechanism like the one described is effectively at work.

The finding that the complexity of the bargaining environment (as essentially measured by direct indicators) is negatively correlated to the share of the formateur is partially supportive of the theoretical argument incorporated in the model of Subsection 2.3.1. However, more specific evidence comes from the estimated coefficient on the variable FORM. The coefficient is indeed negative, as the theory predicts, but it does not pass a zero restriction test at usual confidence levels. This result does not change when the model is re-estimated using the economic variables in addition to the political

and institutional ones, and when a dummy variable *long duration*, taking value 1 for durations longer than the country median, replaces FORM. Thus, albeit there is evidence that complexity in general does matter, there is no conclusive evidence that the duration of the process has any relevance on the share of portfolios of the formateur.

Several alternative specifications of the model have been estimated, with results always remarkably similar. In particular, when potential determinants of the duration of the formation process (i.e. CI) are dropped from the r.h.s. , the estimated coefficient on FORM does not become more significant in statistical terms. The inclusion of the rate of change of the industrial production index in addition to those of the consumer price index and of the exchange rate index does not generate any interesting new finding, and neither does the change of the lag structure (those reported are the best fitting ones). The combined model whose estimates are reported on the right hand side of Table A2.2 includes only the political and institutional variables that are found to be significant in the purely political and institutional model. However, even when including all the political indicators, the coefficient on FORM is still not different from zero and the other coefficients remain stable.

Some interesting results are obtained, though, when the model is re-estimated using the *share of key portfolios secured by the formateur* (SHK) as the dependent variable instead of SHP. The estimated coefficient on SHS decreases and the large standard error implies that it is no longer statistically significant. For instance, in the politico-institutional specification, its WLS estimate is .0144, with a standard error of .0413, the ML estimate is instead .0388, with a standard error of .101. Henceforth, it seems that in the fight over the allocation of key portfolios, parliamentary size does not matter. This result is implicitly consistent with the theoretical model of war of attrition in Section 2.2, where the probability of any party emerging as the winner is not related to its size. The coefficient on FORM (or on the associated dummies) turns positive, but still insignificant.

2.4.3. Determinants of the degree of balance of the outcome of negotiations

The model of cabinet formation where parties bargain directly over policy proposals (Subsection 2.3.2 and Appendix A2.3) can be characterised in terms of a theoretical prediction concerning the degree of balance of the outcome of negotiations. This prediction states that the duration of the process affects the degree of balance through a non-linear U shaped relationship. That is, long and short negotiations generate

more balanced outcomes than negotiations of intermediate duration. To test this prediction, the first necessary step is to define an empirical measure to represent the degree of balance. This proxy will then be used as the dependent variable in a regression model that must include on the r.h.s. the duration of the formation process in both liner and square form.

2.4.3.a The empirical definition of balance

A strict interpretation of the theoretical model suggests that a balanced bargaining outcome is represented by a cabinet whose position on the Left-Right ideological continuum is approximately equidistant from those of the parties in the ruling coalition. Given the policy scales described in Appendix A1.1.a of Chapter 1, the problem is then how to compute the aggregate ideological location of the cabinet. The issue has been briefly discussed in Subsection 1.3.2 of Chapter 1 and lengthier treatment of the problem can be found in Chapter 4. In a nutshell, the ideological location of the cabinet can be measured as the weighted average of the locations of the parties in the ruling coalition. The weights should reflect the effective contribution of each party to the process of policy formation. This implies that different weighing systems can be designed, each based on a different model of cabinet decision making. Of the several structures considered by Laver and Shepsle (1994), here I consider two that seem to have particular relevance in the real world. The first one goes under the name of *cabinet government* and states that decision making is effectively a collective activity in which all cabinet ministers participate. This implies that the contribution of each party is proportional to the number of portfolios it controls and hence that shares of portfolios should be used as weights. The second one is known as *ministerial government* and claims that the structure of decision making is highly decentralised at departmental level. Combined with the evidence concerning the different importance of different portfolios (see Laver and Hunt, 1992), the ministerial government suggests taking the share of key portfolios (including the office of prime minister) controlled by each party as the weights. Notice that in this latter case, some parties could have weight equal to zero.

Formally, let p_i be the share of portfolios received by party i, f_i its share of key portfolios, and θ_i its location on a ten points Left-Right policy space (so that θ_i is effectively a number included between 1 and 10, with 1 indicating extreme left and 10 extreme right). Then, the two possible measures of the location of the cabinet are:

(2.23.a) $LOC1 = \sum_{I=1}^{N}(p_i\theta_i)$ and (2.23.b) $LOC2 = \sum_{I=1}^{N}(f_i\theta_i)$

Clearly, LOC1 in (2.23.a) is based on the model of cabinet government, LOC2 in (2.23.b) is based on the model of ministerial government. Assume that the median of the distribution of the policy locations of all parties in the ruling coalition is θ_M, so that, the two proposed proxies for the degree of balance are:

(2.24.a) $EVEN1 = |\theta_M - LOC1|$ and (2.24.b) $EVEN2 = |\theta_M - LOC2|$

where absolute values indicate Euclidean distances.

Notice that EVEN1 and EVEN2 are effectively constructed as measures of *unbalance*; that is, higher values indicate a less balanced outcome. Thus, as the duration of the formation process increases, according to the theoretical model, they first increase and then decrease, so that the corresponding relationship has the shape of an inverted U.

The measures in (2.24.a) and (2.24.b) strictly adhere to the theoretical formulation. A more general interpretation of the model would however suggest measuring the degree of balance not just with regard to the ideological output of the process, but also in terms of the structure of portfolios allocation. Suppose that a perfectly balanced allocation of portfolios can be designed. Then this allocation would serve as a benchmark against which the effective allocation should be compared. The larger the discrepancies between the benchmark and the effective allocation, the smaller the degree of balance.

I identify two possible benchmarks. The first one is based on the traditional argument suggested by Gamson (1961): each party must receive a share of portfolios which is proportional on a one-to-one basis to its share of coalition seats. The empirical evidence produced in the previous Subsection suggests the Gamson's proposition might not be a perfect description of the reality, but it nevertheless builds on a well founded theoretical argument and has represented a corner-stone of coalitional theory for a long time. The second one arises from the observation of real world coalitional politics. It appears that in particularly difficult bargaining situations, parties agree on an allocation of portfolios in which all of them receives the same share of portfolios. Thus, this "equal shares" allocation appears to have a highly desirable property: it makes an agreement possible even when the probability of success is very low. For this reason I

decide to use it as a benchmark in spite of the fact that it is observed only in a limited number of extreme cases.

Formally, let s_i be the share of coalition seats held by the generic party i, and p_i its share of portfolios. Then, the two additional measures of balance are defined as:

$$(2.25.a)\quad EVEN3 = \sum_{i=1}^{n}\left|s_i - \frac{1}{n}\right| \quad \text{and} \quad (2.25.b)\quad EVEN4 = \sum_{i=1}^{n}|s_i - p_i|$$

where n is the number of parties in the coalition and absolute values now simply indicate absolute values.

Again, EVEN3 and EVEN4 are increasing in the degree of unbalance: the more different the actual shares of portfolios are from the shares predicted by the benchmark, the less balanced the outcome of negotiations.

2.4.3.b Econometric framework and model specification

All the four measures of (un)balance are strictly non-negative and hence the assumption of normality of the distribution is violated once again. A suitable transformation of non negative variables is the *Box-Cox transformation* (Box and Cox, 1964):

$$(2.25)\quad z^{(\lambda)} = \begin{cases} \left(z^{\lambda} - 1\right)/\lambda & \text{for } \lambda \neq 0 \\ \ln z & \text{for } \lambda = 0 \end{cases}$$

where z is a generic variable and λ is the parameter that characterises the transformation.[21]

The general form of the Box-Cox regression can thus be given as:

$$(2.26)\quad y^{(\lambda)} = \alpha + \sum_k \beta_k x_k^{(\theta_k)} + \sum_j \delta_j w_j + \varepsilon \qquad \text{with } \varepsilon \sim N\left[0, \sigma^2\right]$$

[21] In fact, the Box-Cox transformation is defined only for strictly positive variables. If the variable to be transformed takes value zero (as it happens in a very few cases for the measures of unbalance above defined), then the standard procedure in the literature is to add a small positive constant.

Notice that with the general formulation in (2.26), in addition to the dependent variable *y*, the regressors *x* are also transformed (but not the regressors *w*). In fact, in the analysis to be undertaken in this Subsection , only the dependent variable (any of the four EVEN measures) has to be transformed. This is equivalent to set $\theta_k = 1$ in model (2.26). Using the more compact matrix-vector notation, the version of model (2.26) I estimate is written as:

$$(2.27) \quad \mathbf{y}^{(\lambda)} = \mathbf{b}'\mathbf{x} + \mathbf{e}$$

where $\mathbf{y}^{(\lambda)}$ is the vector of transformed dependent variables, **x** is the set of non transformed explanatory variables, **b** is the vector of coefficients to be estimated and **e** is a stochastic error term. The procedure for the estimation of model (2.27) is based on a log-likelihood algorithm developed by Spitzer (1982). Estimators can be shown to be Best Asymptotically Normal.

It is worth stressing that, given the transformation of the dependent variable, the marginal effect of a variable *x* in **x** on the dependent variable *y* is computed as:

$$(2.28) \quad \frac{\partial y}{\partial x} = \frac{y}{x}\frac{\partial \ln y}{\partial \ln x} = \frac{\beta_x}{y^{\lambda-1}}$$

where β_x is the estimated coefficient on the explanatory variable *x* (that is, β_x is an item of **b**). However, since the dependent variable is always a measure of unbalance, a *positive* coefficient on a variable means that *higher values* of that variable *reduce* the degree of balance.

Model (2.27) is specified with any of the four measures of unbalance on the l.h.s. On the r.h.s. the set of explanatory variables **x** will include the *duration of the formation process* (FORM), in both linear and square terms. This is needed to capture the potential non-linearity in the relationship which is predicted by the theory. An inverted U shape would be signalled by a positive coefficient on the linear term and a negative coefficient on the square term.

The absence of any previous contribution in the literature tackling this type of issue leaves me with no indications on the set of controls to be added to FORM and $FORM^2$. I therefore choose a parsimonious specification, where only a few political indicators are included together with the usual rates of change of the economic indices. The political indicators are essentially those reflecting the complexity of the bargaining

environment as previously described (POL, FRA and CI). In addition to that, I construct a variable *relative size of parties in the coalition* (SIZE). SIZE is defined as the effective number of parties in a coalition divided by the absolute number of parties. Henceforth, it is bounded between 0 and 1 and the closer it is to 1, the more equal in size parties are. SIZE accounts for a factor with *prima facie* relevance to balance: bargain between parties of equal strength should result in more balanced outcomes. To the extent that bargaining strength is effectively correlated to parliamentary size, the expected coefficient on SIZE should be found negative.

2.4.3.c Econometric results and sensitivity analysis

In Table A2.3 of Appendix A2.1 the results from the estimation of the Box-Cox regression model (2.27) are reported for each of the four possible definitions of the dependent variable. In addition to the estimated coefficients on the variables in **x**, the maximum likelihood estimates of the λ parameter that characterises the transformation are displayed at the bottom of the table. Notice that these estimates confirm that a simple log-transformation of the dependent variable would not have been the best choice. The sample includes all successful formation attempts that resulted in coalition governments, for a total of 181 observations.

The pattern of estimated coefficients on FORM and $FORM^2$ is broadly consistent with the theoretical predictions. The only exception is represented by the model with EVEN3 as the dependent variable. However, only when the definition of balance EVEN1 is used, estimated coefficients are significant at the 5% and 10% level of confidence. A possible explanation for these not very robust findings is that the theoretical model of Subsection 2.3.2 builds on a either/or assumption concerning the nature (strong or weak) of parties which is possibly too restrictive, albeit rather common in the game theoretic literature on bargaining. When the model is extended to include three types (strong, weak and average), then the relationship between duration and degree of balance is complicated by the fact that negotiations between two average types generate balanced outcomes in an intermediate time. However, the outcomes arising from negotiations between one average type and one extreme type (either strong or weak) are consistent with the prediction of a U shaped relationship, under the assumption that the average type makes concessions at a rate which is the mean of the rates of concession of the two extreme types. The extension to the even more realistic case of a continuous of types produces further complications and makes the relationship

more ambiguous. Nevertheless, the result that in at least one case the link between duration and degree of balance is as predicted by a two-type theoretical set-up suggests that future research along these lines might be worthwhile

In general, there seems to be some degree of volatility of coefficients across different definitions of the dependent variable. Nevertheless, a few findings are consistent. The variables that seem to have the strongest explanatory power are SIZE, POL and FRA. SIZE displays the expected negative coefficient: outcome is more balanced when negotiations take place among parties of relatively equal parliamentary size. More ambiguous are the findings concerning FRA and POL. Since they are both indictors of the degree of complexity of the bargaining environment, one would expect that they should be associated to coefficients of the same sign. The positive coefficient on FRA effectively suggests that a more complex bargaining environment produces less balanced outcomes, but the negative coefficient on POL implies the exact opposite result. A possible explanation for this conflicting evidence has to do with a possible twofold role perhaps played by POL. When defined as the share of supports for extremist parties, POL represents both the distribution of preferences in the party system and the non-coalitionable proportion of the party system. Higher values on the variable thus imply greater conflict between left and right (and hence more complexity), but also a smaller number of potential alternative coalitions (and hence less complexity). To the extent that this second effect prevails, the negative coefficient on POL is not inconsistent with the finding of a positive coefficient on FRA. To shed additional light on this issue, I re-estimated the model defining POL first as the average distance between any two parties in the parliament and then as the total dispersion of policy positions of parties. With these two definitions, POL is more likely to incorporate only (or mostly) the complexity increasing effect. As a matter of fact, its estimated coefficient turns positive, but largely insignificant. The one on FRA remains positive and significant in all cases.

Another intriguing finding concerns the variable CI. This variable displays a significant, positive coefficient only when the dependent variable is defined as the Euclidean distance between the location of the cabinet and the median of the distribution of policy positions in the ruling coalition. In the other two cases, the coefficient is largely insignificant. As a possible explanation, consider that when the degree of unbalance is defined in terms of Euclidean gap, the probability that it takes large values is increasing in the dispersion of the distribution of the policy locations of the parties. As a direct indicator of such degree of dispersion, CI must be positively

correlated to the measure of unbalance. The same would not be true for unbalance defined in terms of discrepancies from benchmark allocations of portfolios.

Given that the literature does not give any indication as to a suitable model specification, sensitivity analysis is particular important in this case. First of all, I re-estimated the model using dummy variables instead of FORM and $FORM^2$. A dummy *long duration* is coded as 1 if the observed duration is longer than the threshold identified by the 66^{th} percentile of the country distribution of durations. A dummy *intermediate duration* is coded as 1 if the observed duration is shorter than the threshold identified by the 66^{th} percentile, but longer than the threshold identified by the 33^{rd} percentile of the distribution of durations. A dummy *short duration* is coded as 1 if the observed duration is shorter than the threshold identified by the 33^{rd} percentile of the distribution of durations. The dummies display occasionally significant coefficients. In general (with the exception of the case where the dependent variable is defined as EVEN3) these coefficients are consistent with the theoretical model: they are negative on *long duration* and *short duration* and positive on *intermediate duration.*

Second, I estimated an even more parsimonious specification of the model, including only duration variables. The pattern of coefficients is, however, analogous to the one displayed by FORM and $FORM^2$ in Table A2.3. Third, I re-estimated the model dropping CI, which might be correlated to the duration of the process, but the level of significance of the coefficients on FORM and $FORM^2$ does not improve. Fourth, I altered the lag structure on the economic variables and dropped insignificant control variables, but results on the other variables do not qualitatively change. Finally, I experimented with a simple log transformation of the dependent variable (adding a small positive constant in the very few cases when unbalance is equal to zero). The estimated coefficients on FORM and $FORM^2$ are never significant, although they are of the correct sign in three cases out of four. Of the other variables, SIZE retains its considerable explanatory power, whilst the standard errors of the estimated coefficients on both FRA and POL gets larger.

2.5 Summary of results and conclusions

This Chapter investigates the issue of cabinet formation in coalition systems as a necessary intermediate step in the understanding of economic policy formation. The literature on this topic is surveyed in Section 2.1. In Section 2.2, building on a set of assumptions directly derived from some observed stylised facts, a theoretical model of

political bargaining based on the war of attrition approach is proposed. A discussion of two alternative forms of bargaining is given in Section 2.3. The three models yield predictions that are tested using the data-set described in Chapter 1. The key findings of the empirical analysis of Section 2.4 can be summarised as follows.

The duration of the process of cabinet formation is found to be increasing in the degree of dispersion of the policy preferences of coalition partners. This result is consistent with the model of war of attrition. There is also evidence that a longer expected duration of the forming cabinet is associated with longer bargaining. Again, the model of war of attrition accounts for this finding. The share of cabinet posts received by the formateur party increases along with the strength of the formateur' s bargaining position and decreases along with the degree of complexity of the bargaining environment. However, there is no evidence of a statistically significant relationship between the share of the formateur and the length of negotiations. This partially contradicts the model of bargaining over the allocation of a cake. The share of key portfolios received by the formateur is independent from its parliamentary size. This result would suggest that in the fight over the control of key portfolios, parliamentary size does not matter much, as the model of war of attrition implicitly assumes. Finally, a few determinants of the degree of balance of the bargaining outcome are identified. Again, an important role is played by the variables reflecting the complexity of the bargaining environment. There is also some weak evidence that the relationship between degree of balance and duration of the process is non-linear and U shaped. Such a relationship is in fact predicted by a theoretical model in which parties bargain over policy proposals in the same way as buyers and sellers bargain over the price of a good to be traded. All above findings are obtained controlling for the impact of the economic conditions at the time of formation and in the n months before negotiations start. Sensitivity analysis is also performed to check the robustness of the econometric results to changes in the model specification.

Throughout the Chapter several possible lines of future research are emphasised. In particular, the model of war of attrition could be extended to provide a better account of the relationship between the state of the economy and the speed of the formation process. A more ambitious step would be to use the set up of Section 2.2 to tackle the issue of how certain features of the formation process affect subsequent cabinet duration. On the empirical side, attention should be devoted, for instance, to the construction of more sophisticated proxies to represent parties' expectations on the duration in office of the forming cabinet. The possibility that a mechanism by which

parties not in control of a key portfolio are compensated by receiving control of a larger number of non key portfolios is another issue that deserves further analysis, both empirical and theoretical. The same is certainly true with respect to the determinants of the degree of balance of the bargaining outcome.

Appendix A2.1. Tables with econometric results

Table A2.1. *The determinants of the duration of the cabinet formation process in western European coalition systems.*

Explanatory Variables	(1) Politico-institutional model	(2) Combined model
POST	-1.0833 (.136)	-1.111 (.164)
INV	-.0587 (.146)	-.293 (.168)
CONT	1.0034 (.173)	.958 (.211)
CARE	-.12008 (.251)	-.035 (.291)
COALC	-.01209 (.167)	.041 (.219)
RFT	-.1526 (.134)	-.179 (.170)
CI	-.2719 (.152)	-.309 (.186)
POL	-.6415 (.573)	-.663 (.703)
FRA	-1.3140 (.937)	-1.332 (1.09)
TPV	-.0232 (.011)	-.005 (.013)
IPV	.00298 (.083)	-.0407 (.097)
ALT	.05075 (.300)	-.130 (.371)
DSTRONG	-.1275 (.133)	-.109 (.153)
CPG		-.210 (.171)
ERG		-.597 (.275)
IPG		-.043 (.020)
CPG(3)		-.044 (.202)
ERG (3)		-.099 (.038)
IPG(3)		-.040 (.037)
Observations	319	228
Log-rank test	140.335 (p-value = .0000)	106.311 (p-value = .0000)
Log-likelihood	-1467.135	-968.035

Standard errors in brackets. The number in brackets next to the economic variables CPG, IPG and ERG is the number of lags. The log-rank test is a version of the Lagrange Multiplier Test of the null hypothesis H_0: $\mathbf{b} = 0$. High p-values imply rejection of the null and an overall good fit of the model.

Table A2.2 *Determinants of the share of portfolios received by the formateur party.*

	Politico-institutional model			*Combined model*		
regressors	*WLS*	*ML*	*OLS*	*WLS*	*ML*	*OLS*
SHS	1.2978***	3.1258***	.41279***	1.2865***	3.1363***	.42989***
DSTRONG	.05478 *	.04877	.00706	.068907**	.07926	.0077231
DLARGE	.14424***	.62997***	.17654***	.19919***	.69247***	.18572***
DEF	.02286	.02403	.012514			
CARE	.19022***	.26508	.041239	.19526***	.26218*	.042061
CI	-.1985***	-.25271**	-.0645***	-.18714***	-.25990**	-.06771***
ENP	-.3796***	-.4880***	-.1603***	-.38838***	-.4521***	-.14461***
ANP	-.01716	-.06424	-.01493			
RNP	.29205***	.33215	.091804	.25513***	.26489**	.06201***
LNDUR	-.007256	-.27822	.0022327	-.014127	-.039985	-.00117
POL	.09333	-.00324	-.099778			
FRA	-.31869	.69716	.18617			
CPG				1.4331	-5.2062	-.21309
CPG(2)				6.0077**	13.724	1.795
ERG				1.4601**	3.533*	.52408*
ERG(2)				.31204	.99029	.1591

There are 181 observations in the sample. The dependent variable is the share of cabinet posts received by the formateur (SHP). *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level.

Table A2.3 *Determinants of the degree of balance of the bargaining outcome.*

	EVEN1	EVEN2	EVEN3	EVEN4
LNDUR	.23898	.27833 *	-.02387	.011982
LNDURSQ	-.0.74991	-.06793 **	-.003205	-.007411
CARE	-.59479 *	-.44173	-.02265	-.14026
SIZE	-.73099	-1.3883 ***	-1.6482 ***	-.70728 ***
POL	-1.9680 **	-2.3728 ***	-.45496 ***	.23315
FRA	4.7145 ***	4.0304 ***	.73839 ***	.94757 **
CI	.2352 **	.29200 ***	-.03683	.04345
CPG	-.10627	.16851	.071134 *	.027456
CPG (3)	.04092	-.06061	-.034293	.074438
ERG	.07129 *	.07033 **	.86585	1.5728
ERG(3)	-.09045	-.04408	-.24713	1.9380
λ	.27773	.23442	.66391	.421

There are 181 observations in the sample. Dependent variables are the 5 measures of unbalance described in the text. *** indicates significance at the 1% level, ** indicates significance at the 5% level and * indicates significance at the 10% level. The last row reports ML estimates of the parameter that characterises the power transformation of the dependent variable.

Appendix A2.2. Symmetric Nash Equilibrium in the model of war of attrition.

Consider the two-party game case. Let negotiations start at $t = 0$ and end at T; that is, T is the time at which one of the two contestants gives up. Given a common instantaneous cost of bargaining κ and a common discount rate factor ρ, the pre-formation utility flow for generic player i is given by:

$$\text{(A2.1)}\quad U_i(t) = -\int_0^T \kappa e^{-\rho x} dx$$

After formation, the instantaneous disutility of party i is equal to:

$$\text{(A2.2)}\quad u_{i,L} = -\delta_i(\theta_j - \theta_i)^2 \quad \text{with } \theta_i > 0, \theta_j > 0, 0 \le \delta_i \le 1 \text{ and } i \ne j; i = A, B \quad \text{or}$$

$$\text{(A2.3)}\quad u_{i,W} = 0$$

depending on whether it is loser (L) or winner (W). The parameter δ_i reflects the nature of the player; it is party specific and not observed by the other party j.

From (A2.2) and (A2.3) the post-formation utility flows of party i in case of defeat and victory respectively are determined as:

$$\text{(A2.4)}\quad V_{i,L} = -\frac{\delta_i(\theta_j - \theta_i)^2}{\rho} \quad \text{and} \quad \text{(A2.5)}\quad V_{i,W} = 0$$

Utility flows (A2.1), (A2.4) and (A2.5) can be used to construct a Von Neumann-Morgenstern utility function to be maximised with respect to a given concession time T_i. First define the payoffs in case of defeat and win by combining pre-formation utility flows and post-formation utility flows:

(A2.6) $\Pi_{i,L}(T) = U_i(T) + {}_L V_i e^{-\rho T}$

(A2.7) $\Pi_{i,W}(T) = U_i(T)$

Then, these payoffs must be weighed by the probability of party *i* being the loser or the winner. Given the rules of the game, if S(T) is the distribution of optimal concession times T, then 1-S(T_i) is the probability of party being the loser. The distribution S(T) is not known to players (if it were, then there would be no reason to play the game). The Von Nuemann-Morgenstern utility function can thus be written as:

(A2.8) $EU(T_i) = [1 - S(T_i)]_L \Pi_i(T_i) + \int_0^{T_i} {}_W \Pi_i(x) s(x) dx$

where T_i is the time of concession optimally chosen by i given its prize valuation υ_i. The prize valuation is simply the difference between (A2.5) and (A2.4). The assumption is made that the distribution of prize valuations F(υ_i) is known.

By taking the first derivative of (2.8) w.r.t. T_i the following is obtained:

(A2.9) $\frac{dEU}{dT_i} = e^{-\rho T_i}\left\{s(T_i)\upsilon_i + [1 - S(T_i)]\left[-\kappa\left(1 + e^{-\rho T_i}\right) + \rho\upsilon_i\right]\right\}$

Differentiating (A2.9) w.r.t υ_i yields the result that the optimal concession time is monotonically increasing in the prize valuation:

(A2.10) $\frac{d^2 EU}{dT_i d\upsilon_i} = e^{-\rho T_i}\left[s(T_i) + \rho(1 - S(T_i))\right] > 0$

The result in (A2.10) implies that the two distributions S(T) and F(υ) are linked by the following relationship:

(A2.11) $[1 - S(T_i)] = [1 - F(\upsilon_i)]$

Equation (A2.11) can then be used to define the expected utility function (A2.8) in terms of the known distribution F(υ_i). The problem is then to define a function T(υ) that identifies the optimal time of concession (that is, the time of concession that maximises the expected utility of party *i*) for any given possible prize valuation υ.

Following Bliss and Nalebuff (1984), let us suppose that the function T(υ) exists. Suppose that party *j* behaves according to such behavioural function T(υ). Party *i*, whose valuation of the prize is υ_i, can choose any time $T_i = T(\upsilon_i^*)$ where υ_i^* can be different from the true υ_i.

The expected utility function to be maximised is:

(A2.12) $EU(\upsilon^*, \upsilon) = -\upsilon[1 - F(\upsilon^*)] - \kappa T(\upsilon_i^*) + \int_{\upsilon_{\min}}^{\upsilon^*} f(x)(\kappa T(\upsilon^*))dx$

where the subscript i has been dropped to simplify the notation.

The f.o.c. yields:

$$\text{(A2.13)} \quad \frac{dEU}{d\upsilon^*} = \upsilon f(\upsilon^*) - \kappa T'(\upsilon^*) + \kappa F(\upsilon^*) T'(\upsilon^*) = 0$$

But, by definition of T(υ), party i finds it optimal to set $\upsilon_i^* = \upsilon_i$. That is, party i must determine the optimal time of concession as a function of his own real prize valuation. Thus, setting $\upsilon_i^* = \upsilon_i$ and rearranging terms one obtains the equilibrium condition (2.2) stated in Section 2.2 of this Chapter. Equation (2.2) implicitly defines the behavioural function T(υ). A simple integration yields equation (2.3) with the additional boundary condition that the player whose prize valuation is equal to υ_{min} quits immediately.

Notice that, when there are more than two parties, the prize valuation must be defined as in equation (2.7) of Section 2.2. The assumption that even in this case F(υ) is known (see footnote 8), makes it possible to follow the same steps just outlined for the two-party game to obtain the optimal concession time as determined in equation (2.8) of Section 2.2.

Appendix A2.3. A more technical treatment of the theoretical models of bargaining discussed in Section 2.3

A more formal presentation of the arguments presented in Section 2.3 is here given for the case of two-player coalitions.[22] Although the discussion is a technical one, it will refer to the original contributions in the game theoretic literature for additional mathematical proofs.

A2.3.a Bargaining over the allocation of a cake.

Let the coalition be formed by two parties, A and B, and normalise the size of the cake (i.e. the set of cabinet posts) to 1. Bargaining proceeds as follows. At any time t, player i (i = A, B) makes an offer which specifies a partition s of the cake (where s is the share of cabinet posts that player A receives). If player j (j = A, B and $j \neq i$) accepts the offer, then the outcome of the game is represented by the pair (s, t). If instead the

[22] As a matter of fact, two-party coalitions are the most frequently observed form of government in western European coalition systems (see the data reported in Table 1.2 of Chapter 1).

offer is rejected, then at $t+1$ player j will make an offer that i can either accept or refuse. Negotiation continues until an agreement is reached. Perpetual disagreement is possible, but it is assumed to yield the lowest possible level of utility for both players. For each unit of time spent on bargaining, player A pays a fixed cost c_A and player B pays c_B. By assumption $c_A + c_B < 1$. Since parties only care about the share of portfolios received, the utilities associated to the generic outcome (s, t) are $s - c_A t$ for player A and $1 - s - c_B t$ for player B. Each player is characterised by a preference relation $\succeq_i$ which satisfies the following properties:

(A2.14) $(s,t) \succeq_i (s,t+1)$ for all t $\in$ T and every partition s $\in$ S $= [0,1]$

(A2.15) $(s,t) \succeq_i (z,t+1)$ iff $(s,0) \succeq_i (z,1)$ and $(s,t) \succeq_i (z,t)$ iff $(s,0) \succeq_i (z,0)$

Property (A2.14) states that time is valuable, so that a partition s today is preferred to the same partition s tomorrow. Property (A2.15) establishes that preferences are time stationary, so that if a partition s today is preferred to a partition z tomorrow, then the partition s at any time t will be always preferred to the partition z at time $t+1$. In addition, preferences are assumed to be continuous.

To generate equilibria with delayed agreement let party A be uncertain about the size of the bargaining cost of B. In Subsection 2.3.2 I argue that player A can be taken to be the formateur (i.e. the first mover). Thus, let c be the commonly known bargaining cost of player A. Party B can be of two types: the strong type has cost of bargaining equal to c_S, the weak type has cost of bargaining equal to c_W. Of course, it must be that $c_W > c > c_S$. Moreover $(c_W + c_S + c) < 1$. The true nature of party B is known only to B itself.

A key feature of games with incomplete information is that they involve considerations of reputation: a weak B type has an incentive to conceal his true nature and mimic the behaviour of a strong player. Party A will form its strategy on the basis of the probability which he assigns to the event "B is weak". Furthermore, party A's beliefs will be updated at each stage of the game according to the history of the game and following the Bayesian procedure. The relevant solution concept for this class of models is the one of sequential equilibrium (Kreps and Wilson, 1982). Let f^t be the strategy of party A (first mover) at time t. In the game with alternating offers, f^t is defined as follows:

- for t odd, $f^t : S^{t-1} \rightarrow S$

- for t even, $f^t : S^t \rightarrow \{Y, N\}$

where S = [0,1] and Y stands for yes (accept) and N for no (reject).

The strategies for party B g^t (weak B type) and h^t (strong B type) are defined symmetrically respect to f^t. Let also the term $\omega^t(s^1....s^t)$ be party A's subjective belief that party B is strong after having observed the sequence of offers and rejections $s^1.....s^{t-1}$, with s^t representing the last offer made by B to which A still has to reply. A sequence $\omega = (\omega^t)_{t=0,2,4...}$ is a *belief system.* Rubinstein (1985a) defines a sequential equilibrium for the game of sharing the pie as a four-tuple $\langle f,g,h,\omega \rangle$ satisfying the following requirements:

1. that after any history[23], a player's residual strategy is a best response against his opponent's residual strategy,
2. that the belief system is updated according to the Bayes rule,
3. that after an unexpected (that is, off equilibrium path) move of player B, player A chooses a new conjecture about the true nature of player B and updates this conjecture using the Bayesian approach until a new unexpected move is made by player B.

Requirement 1 clarifies the nature of the sequential equilibrium as a refinement of Nash solution concept. Requirement 2 implies that player A is rational in making use of the new information which is released during the negotiation. Requirement 3 focuses on the new belief that player A must form when the game reaches a node that is off the equilibrium path and hence when Bayes rule cannot be applied (since a zero probability is assigned to the unexpected event). With *optimistic conjectures*, whenever an unexpected move of party B is observed, party A concludes that the true nature of B is weak. On the contrary, with *pessimistic conjectures*, an unexpected move played by B leads A to believe he is playing against a strong opponent. Finally with *rationalising conjectures*, the observation of an unexpected move at time t determines a change in conjecture only if this unexpected move is such that player B reveals himself to be strong (and in that case ω is set equal to 0). For example, if the offer s^{t-1} of player A is rejected by player B who in turn offers s^t such that $(s^t,1) \geq_{Bstrong} (s^{t-1},0)$ and

[23] A history is a sequence of proposed partitions and responses. In the game of the allocation of the pie, histories can be of two types. In *terminal* histories the last item of the sequence can be either Y (accept) or perpetual N (rejection); in the first case the history is said to be finite, in the second case infinite. In *non terminal* histories the last item is a proposed partition at time t which will be either rejected or accepted.

$(s^{t-1},0) >_{Bweak} (s^t,1)$, then player B reveals his strong nature and A selects $\omega^t = 0$. Other moves that do not reveal the true nature of B will not determine changes in the conjecture.[24]

Equilibrium outcomes depend upon the specific method of choosing conjectures. However, for each possible form of conjecture, with one-sided, incomplete information, the sequential equilibrium can be shown to be unique.[25]

The sequential equilibrium with pessimistic conjectures is characterised as follows:

(A2.16.a) $\langle (c_s,1),(c_s,1)\rangle$ if $\omega^0 < \dfrac{c_s + c}{c_w + c}$

(A2.16.b) $\langle (c_w,1),(0,2)\rangle$ if $\dfrac{2c}{c_w + c} > \omega^0 > \dfrac{c_s + c}{c_w + c}$

A note about the notation: in the tuple $\langle\cdot\rangle$, the pair on the left specifies the outcome when B is weak and the pair on the right is the outcome when B is strong.

One interpretation of the solution can be given as follows. Suppose player B is strong and A offers $s > c_S$. If B refuses and counter-offers $s = c_S$, then A will accept. So, if A believes he is playing against a strong B type, then he will play immediately $s = c_S$, thus obtaining a payoff of $(c_S - c)$ instead of $(c_S - 2c)$. The offer $s = c_S$ is accepted by strong B. In fact, B could refuse and hold out for the whole pie. Refusal of $s = c_S$ would represent an unexpected move and according to pessimistic conjectures, A would definitely conclude that he is playing against a strong B type. This implies that whatever the counter-offer of B is, A will accept. Thus, B can make the offer $s = 0$ and obtain the payoff $1 - 2c_S$. If he immediately accepts $s = c_S$ then he gets $1 - c_S - c_S$. Therefore B is not better off refusing $s = c_S$ at stage 1, so that it can be concluded he will immediately accept $s = c_S$.[26] If strong B accepts, then also the weak B type will accept the same offer. So it can be concluded that the initial offer $s = c_S$ made by A will be accepted by player B whatever his type. Moreover, A knows he cannot improve on

[24] Other methods of choosing *conjectures* are considered in the literature. For a detailed discussion see Rubinstein (1985, a).

[25] A formal proof of the characterisation of the equilibria discussed below can be found in Rubinstein (1985a,b).

[26] It is common in the literature to assume that if player i is indifferent between partition s at time t and partition s' at time $t+k$ (in the sense that the two equilibrium outcomes (s,t) and $(s', t+k)$ yield the same utility for i), then i will accept s at time t without delaying agreement further.

this if B is strong. Thus, if A's initial belief ω^0 is low enough (below the threshold $(c_S + c)/(c_w + c)$), then A assigns a rather large probability to the event "B is strong" and offers immediately $c_S = s$. Whatever the type of player B, the game ends immediately. Suppose now that B is weak. If A offers $s > c_W$, then even the weak B will refuse. In effect, B can make the counter-offer $s = 0$ and induce A to believe that he is facing a strong opponent. As already discussed, in this case A decides to accept any counter-offer made by B in the second period. Thus the weak B type can get the whole pie in period two, with a payoff equal to 1- $2c_W$. If he had accepted $s > c_W$ his payoff would have been smaller than 1 - c_W -c_W and hence it is rational for the weak B type to refuse any $s > c_W$. However, $s = c_W$ would be accepted by the weak B type, so that if A believes he is playing against a weak B type (that is, if the initial belief ω^0 is above the threshold $(c_S + c)/(c_w + c)$), then he offers immediately $s = c_w$ and weak B accepts, ending the game with the pair $(c_W, 1)$. But if A is wrong and B is strong rather than weak, offer $s = c_W$ will be refused. Strong B will make a counter-offer $s = 1$ which is accepted by A (who realises that he is playing against a strong opponent). The payoffs for B are 1- $2c_S$ if he holds out for the whole pie and 1 - c_W - c_S if instead he accepts the initial offer $s = c_W$. Since $c_W > c_S$ there is no doubt that strong B will hold out and the equilibrium outcome will be the pair (0,2).

With optimistic conjectures sequential equilibrium outcomes are as follows:

(A2.17.a) $\langle (s^*,1),(s^*,1)\rangle$ for every $1 - c + c_s \geq s^* \geq c$ if $\omega^0 \leq \dfrac{2c}{c_w + c}$

(A2.17.b) $\langle (s^*,1),(s^* - c_w,2)\rangle$ for every $1 - c - c_s \geq s^* \geq c_w$ if $\omega^0 > \dfrac{c_s + c}{c_w + c}$

The equilibrium is characterised as follows. When the initial belief ω^0 is sufficiently low (i.e. below the threshold specified in (A2.17.a)), player A has no incentive to deviate from the equilibrium strategy s^*. If he does so, in fact, he gets (s^*-c+c_W) with probability ω^0 and (s^*-$2c$) with probability (1-ω^0). The aggregate expected payoff is not larger than s^*. The strong B type could be tempted to reject s^*. This off the equilibrium path move would induce the optimistic conjecture that B is weak. Thus, following the rejection of the initial offer s^*, the game would proceed as the standard

game between A and a weak B type, with the weak B type as the next mover. From the previous discussion on the equilibrium with complete information, B will get a share 1 - c and his payoff will be 1 - c -2 c_S. The condition that $s^* \leq 1 - c + c_S$ in (A2.17.a) guarantees that the payoff 1 - s^* - c_S obtained by immediately accepting s^* is not smaller than the one obtained from rejecting. It can be concluded that strong B type immediately accepts s^* and so does the weak B type.

In case of a sufficiently high initial belief ω^0 (above the threshold in (A2.17.b)), A believes he is playing against a weak B, but he cannot hope to get more than s^* since, if A plays $s > s^*$, then weak B can refuse and offer $s^* - c_W$ which is accepted by A and preferred by B to $s > s^*$. B could try to make a higher counter-offer. This off the equilibrium path behaviour would generate the optimistic conjecture $\omega^1 = 1$ and, as before, the game would proceed along the lines of the complete information case with player A making the first offer. B would end up with nothing, apart from the costs paid for three periods. Therefore, weak B type immediately accepts s^*. If instead B is strong when ω^0 is high, then the initial offer s^* is refused because strong B type knows A will accept the offer $s^* - c_W$ in the second period. Given that $c_W > c_S$, the payoff $1-s^*-c_S$ is smaller than $1-s^*+c_W-2c_S$ and hence strong B will hold out until the second period, generating an equilibrium outcome defined by the pair $(x^*-c_W, 2)$.

Finally, for any sequential equilibrium with rationalising conjectures:

(A2.18.a) if $\omega^0 > \dfrac{2c}{c+c_w}$, the the outcome is $\langle (1,1),(1-c_w,2)\rangle$

(A2.18.b) if $\dfrac{2c}{c+c_w} > \omega^0 > \dfrac{c+c_s}{c+c_w}$ then the outcome is $\langle (c_w,1),(0,2)\rangle$

(A2.18.c) if $\dfrac{c+c_s}{c+c_w} > \omega^0$ then the outcome is $\langle (c_s,1),(c_s,1)\rangle$

The intuition underlying (A2.18.b) and (A2.18.c) follows the same argument outlined for the sequential equilibrium with pessimistic conjectures. The result in (A2.18.a) can be explained as follows. Party A is sure that his opponent is weak. When faced with a weak B type, A will go for the whole pie and hence he offers $s = 1$. Rejecting this offer, weak B type cannot hope to do any better than - c_W. To see this,

consider that if B rejects, then A will accept a counter-offer $s = 1 - c_W$, which yields a payoff of $-c_W$ to B. Following the tie-breaking rule discussed in footnote 12, B will not reject the initial offer $s = 1$ to obtain c_W in the second period. At the same time, B cannot hope that A will accept a counter-offer $s < 1 - c_W$ and hence weak B type maximises his payoff simply by leaving the whole pie to A immediately. If the prior belief of A is incorrect, then A believes he is facing a weak B type whilst the true nature of B is strong. The initial offer $s = 1$ is now rejected: since $c_W > c_S$, the payoff obtained with the rejection of $s = 1$ and the counter-offer $s = 1 - c_W$ is $c_W - 2c_S$ and it is larger than the payoff $-c_S$ received if $s = 1$ is accepted immediately. Thus, strong B type rejects the initial offer of A, the game extends to the second period and the equilibrium outcome is represented by the pair $(1 - c_W, 2)$. The reason for A to accept the counter-offer $s = 1 - c_W$ is that with rationalising conjectures, ω^1 drops to 0 when B rejects $s = 1$, and hence A is convinced that he is playing against a strong opponent. Notice that the same sequence of rejections and counter-offers would be obtained were the initial offer of A smaller than 1, unless $s \leq c_S$. This latter proposal would be immediately accepted by strong B type (and hence also by weak B), but given the comparatively large value of ω^0 (above the threshold specified in (A2.18.a)), it is not rational for A to open the negotiation with such a low offer.

According to the results in (A2.16.a), (A2.16.b), (A2.17.a), (A2.17.b), (A2.18.a), (A.18.b) and (A.18.c), the share of the cake received by the first mover party A (the formateur) declines over time. That is, when the game proceeds beyond the first period, the equilibrium share of the first mover is smaller than the one it would receive were the game settled immediately. This is the prediction tested in Subsection 2.4.2 of Section 2.4. A word of caution is however necessary. The extensive form of the bargaining game just discussed is the one that I believe is most suitable to represent the key features of real world political negotiations. Nevertheless, several alternative forms could theoretically be designed to formalise the problem of allocation of a cake and the characterisation of the equilibrium might differ depending on which form is used. There is scope for future work in this area directed at the comparison of the empirical performance of different extensive forms.

A2.3.b Bargaining over policy proposals

Consider a policy space represented by a left-right continuum. The ideal locations of party A and B on this continuum are θ^*_A and θ^*_B respectively. Let $\theta^*_A < \theta^*_B$ so that party A is relatively "left-wing" and B is relatively "right-wing". The two parties must reach an agreement over the policy of the coalition. This "compromise" policy will be somehow intermediate between the two extremes θ^*_A and θ^*_B; that is, party A must shift on the policy continuum towards the right and party B must shift towards the left. Of course, this re-location has some ideological costs: both parties must give up some of their ideology in order to achieve a compromise. Let ξ_i reflect the nature of party *i*. Parties with smaller ξ_i are stronger, in the sense that their are less willing to re-locate in order to achieve a compromise. Then, given the ideal policies θ^*_A and θ^*_B and the party specific nature ξ_A and ξ_B, two "reservation policies" θ^S_A and θ^S_B can be defined. These reservation policies will represent how far away from their ideal location the two parties are prepared to go in order to reach a compromise with the partner.

Formally:

(A2.19.a) $\theta^s_A = \theta^*_A \xi_A$

(A2.19.b) $\theta^s_B = \theta^*_B / \xi_B$

With $\xi_A > 1$ and $\xi_B > 1$ and $(\xi_A \neq \xi_B)$ the reservation policy of A will be shifted to the right relative to his ideal policy, whilst the reservation policy of B will be shifted to the left relative to his ideal policy; that is $\theta^*_A < \theta^s_A$ and $\theta^s_B < \theta^*_B$. Notice that when party *i* is relatively weak (high values of ξ_i), its reservation policy tends to be more distant from *i*'s ideal policy and closer to party *j*'s ideal policy: the party is prepared to give up much of its ideology in order to achieve a compromise. Since all parties do prefer a compromise policy closer to their ideal policy, a party with high ξ would like, at least to some extent, to mimic the behaviour of a party with low ξ, in order to obtain a better policy deal. In other words, if the degree of office motivation of each party is known only to the party itself, then usual issues of reputation building enter the analysis and the notion of sequential equilibrium proposed by Kreps and Wilson (1982) becomes the relevant solution concept.

Ideal and reservation policies for the two parties are represented in the following Figure A2.1:

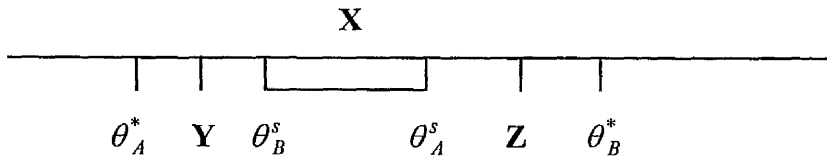


Figure A2.1 *Bargaining over policy proposals: reservation policies for a two-party game.*

By definition of reservation policy, party A will never accept a compromise θ such that $\theta > \theta^S_A$ (a point such as **Z** in the diagram): θ^S_A is the most "right-wing" policy party A is ready to accept, if the compromise requires a further shift to the right, then A prefers leaving the coalition. Similarly, party B will never accept a compromise θ such that $\theta < \theta^S_B$ (a point such as **Y** in the diagram). This implies that the compromise solution must be one of the policies included in the set $[\theta^S_A, \theta^S_B]$. In the diagram, the set of feasible compromise solutions is **X**. If the set is empty, i.e. if $\theta^S_A < \theta^S_B$, then no compromise is possible. If the set is non-empty, then party A is better off if the compromise solution is shifted to the left of the set of feasible outcomes, whilst party B is better off if the compromise solution is shifted to the right of **X**. It then follows that the utility for both players must be increasing in the Euclidean distance between the compromise policy and their own reservation policies.

This set-up can be interpreted as a problem of bargaining between a seller (party B) and a buyer (party A) over the determination of the price θ of a good to be traded, with θ^S_A and θ^S_B representing the reservation prices of the two traders and θ^*_A and θ^*_B their valuations of the good. The vast literature on bargaining in markets is surveyed in Roth (1985), Osborne and Rubinstein (1990 and 1994) and Fudenberg and Tirole (1992). A feature common in all these models is that, in the case of two sided uncertainty over the nature of players, multiple equilibria arise (see, for instance, Watson, 1998 for a characterisation of several of these possible equilibria). Cramton (1992) defines a particularly appealing equilibrium in which parties delay making offers. The underlying idea is close in spirit to the one incorporated in the model of war of attrition: players wait in order to signal their strength to the opponent. Once one of the two players makes an offer, the game enters a one-sided information stage, where a unique equilibrium can be identified using the results in Rubinstein (1982) and Fundeberg et al. (1985).

Cramton's model is attractive in the sense that it formalises a common sense intuition: the stronger player will obtain a more favourable agreement. This result is derived by first assuming that players engage in a timing game to decide who makes the first offer (thus, in terms of political bargaining, the identity of the formateur is endogenous and does not follow from an exogenously imposed rule). Each player determines an optimal delay function (the counterpart of the optimal concession time function $T(\upsilon)$ of the war of attrition). This function is increasing in each player's reservation value (reservation policy) and decreasing in the expected reservation value (expected reservation policy) of the other party. It turns out that the weakest (the one with higher ξ) will make the first offer, thus revealing its type. The game then enters a one-sided uncertainty stage. Building on an argument similar to the one just discussed for the model of bargaining over the allocation of a cake (see A2.3.a), the first mover in the game with one sided uncertainty makes progressive concessions. The final agreement is closer to the valuation (ideal policy) of the stronger of the two partners.

The model thus predicts unbalanced outcomes. The actual degree of unbalance however, depends upon the difference in strength between the two players. If they are both relatively strong or relatively weak, then the compromise is more favourable to one of the two, but still relatively equidistant from the two initial positions. If, instead, there is a wide gap in strength, then the difference in the relative distance of the compromise from the two initial positions increases. The total time required to complete the agreement is the sum of the time taken to complete the timing game at the first stage plus the time taken to solve the game of one-sided information at the second stage. Cramton shows that this total time is larger the smaller the set of feasible outcomes **X**. This in turn implies that delay is increasing in the strength of both players: two relatively strong players bargain longer than two relatively weak players and one weak player and one strong player bargain longer than two relatively weak players but less than two relatively strong players. Combining this result with that concerning the location of the final agreement relative to the initial positions of the two parties, one obtains the prediction of a non-linear relationship between duration and degree of balance which has been tested in Subsection 2.4.3 of Section 2.4.

The formal characterisation of the equilibrium agreement when Cramton's model is adapted to the political bargaining game can be understood in terms of the Figure A2.1. Given the initial positions θ^*_A and θ^*_B and nature ξ_A and ξ_B, define the following Euclidean distances:

(A2.20.a) $\Delta_{i,i} = \left|\theta_i^S - \theta_i^*\right|$ for i= A,B

(A2.20.b) $\Delta_{j,i} = \left|\theta_j^S - \theta_i^*\right|$ and $\Delta_{i,j} = \left|\theta_j^S - \theta_i^*\right|$ for i = A,B; j = A,B and $i \neq j$

(A2.20.c) $\mathbf{X} = \left|\theta_i^S - \theta_j^S\right|$ for i = A,B; j = A,B and $i \neq j$

Equation (A2.20.a) is the distance between the ideal policy of party i and its own reservation value. Given the definition of reservation policy in equations (A2.19.a) and (A2.19.b), $\Delta_{i,i}$ is decreasing in strength for both parties. Equation (A2.20.b) is the distance between the reservation policy of a party and the ideal policy of the other party. The larger this gap, the more distant the interval of feasible policy agreements **X** from the preferred policy of party i. Notice that if $\Delta_{j,i}$ is significantly larger than $\Delta_{i,j}$, then the set of feasible of outcomes **X** is located closer to θ^*_j than to θ^*_i. In that case, the probability that the outcome will be significantly more favourable to j increases. The degree to which $\Delta_{j,i}$ and $\Delta_{j,i}$ are different depends on the relative size of ξ_i and ξ_j: the smaller the difference in nature, the smaller the gap between $\Delta_{j,i}$ and $\Delta_{i,j}$. Finally, equation (A2.20.c) defines the size of the set of feasible policy outcomes **X**. Notice again that the stronger the two parties are, the smaller the set **X**.

Suppose now that both A and B are relatively strong. Then $\Delta_{i,i}$ is small for both, $\Delta_{B,A}$ and $\Delta_{A,B}$ are relatively similar and **X** shrinks. This case is represented in Figure A2.2 below:

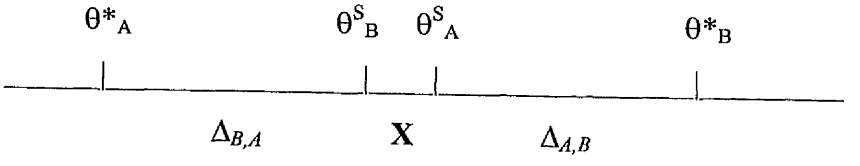


Figure A2.2 *Bargaining over policy proposals: the case of two strong parties.*

Since **X** is equidistant between from the two ideal policies, then the outcome of the negotiation process is most likely to be balanced. At the same time, however, the relatively small size of **X** implies that bargaining will take longer.

The case with two relatively weak parties is represented in Figure A2.3. The key difference is that now $\Delta_{i,i}$ is relatively large for both parties. Given that $\Delta_{B,A}$ and $\Delta_{A,B}$ are of relatively equal size (since parties do not differ in nature), the set of feasible solutions **X** is significantly larger compared to the case in Figure A2.2, but still centrally

located. The conclusion is that it will take a relatively short time to achieve an agreement which is most likely to be balanced.

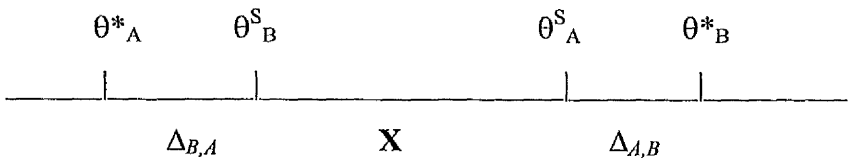


Figure A2.3 *Bargaining over policy proposals: the case of two weak parties.*

Finally, suppose that party A is significantly weaker than party B. Then $\Delta_{A,A} > \Delta_{B,B}$. moreover, the different nature implies that $\Delta_{B,A} - \Delta_{A,B}$ is significantly larger than zero, so that **X** is shifted towards θ^*_B. Finally, the size of **X** is intermediate between the two cases in Figure A2.2 and A2.3. The equilibrium agreement is most likely to be significantly closer to θ^*_B than to θ^*_A and the time required to achieve it is less than in the case of two weak parties but more than that in the case of two strong parties. This situation is depicted in Figure A2.4.

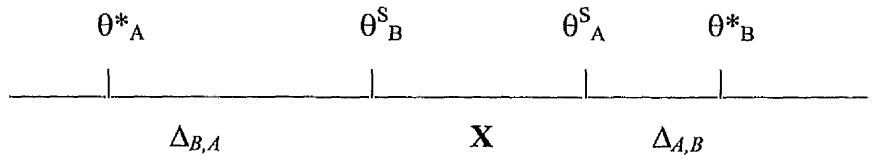


Figure A2.4 *Bargaining over policy proposals: the case of parties of different strength.*

Of course, the case of B weak relative to A is symmetric to the one in Figure A2.4. The conclusion is that, when balance is defined with respect to the distance between the policy agreement and the ideal policies of the parties involved in negotiations, more unbalanced outcomes are observed in connection with intermediate durations.

Appendix A2.4 Variables description

Let n be the number of parties in a coalition, m the number of parties in the legislature, s_i the share of coalition seats controlled by party i, l_i the share of seats held by party i as a proportion of total seats in the parliament, θ_i party i's ideological location on a ten points Left-Right continuum, r the total number of key portfolios to be allocated (taken from Laver and Hunt, 1992) Then, the following variables are defined:

FRA *Effective number of parties in the legislature* (Laasko and Taagepeera, 1979): $\text{FRA} = 1/\left(\sum_{i=1}^{m} l_i^2\right)$

POL *Polarisation of preferences in the party system.* Three alternative definitions are considered.

1. POL 1: According to Powell (1982) POL is the sum of the share of votes (or seats) received by extremist parties. Extremist parties are those whose ideological orientation is towards the radical change of the existing socio-political system. In my data-set, a party is classified as extremist if it falls into in one or more of the following categories. (i) parties explicitly labelled as Communists or neo-Fascists, (ii) parties included in the original list provided by Powell (1982), (iii) parties demanding the partition of existing nations on the basis of ethno-linguistic differences, (iv) parties located to the right of 8.5 or to the left of 2.5 on the ten point ideological scales described in Appendix A1.1 of Chapter 1, (v) parties whose ideological orientation, as stated in *Political Parties of the World* (Keesing's Publications, 1986), Keesing's Record of World Events (various issues), Mackie and Rose (1997) and the election page at *www.agorà.stm.it* is unambiguously extremist in the sense specified by Powell.
2. Overall dispersion of the policy positions of parties in the legislature:
$$\text{POL } 2 = \frac{m\sum_{i=1}^{m}\theta_i^2 - \left(\sum_{i=1}^{m}\theta_i^2\right)}{m(m-1)}$$
3. Average Euclidean distance between any two parties in parliament:
$$\text{POL } 3 = \frac{\sum_{k=1}^{K} d_k}{k}$$
where k is a generic pair of two parties i and j in the parliament, d_k is the Euclidean distance between these two parties and K is the total number of possible pairs of parties.

ANP *Absolute number of parties in the coalition.* It is equal to n; that is, ANP is the number of parties included in the coalition, where each party is counted as one independently from its size.

ENP *Effective number of parties in the coalition.* It is a simple modification of FRA above: $\text{ENP} = 1/\left(\sum_{i=1}^{n} s_i^2\right)$

RNP *Real number of parties in the coalition.* $\text{RNP} = \text{ANP}/r$

CI *Conflict of interest.* Dispersion of the policy positions of the n coalition partners. Four different definitions are considered:

1. CI 1 $= \dfrac{n\sum_{i=1}^{n}\theta_i^2 - \left(\sum_{i=1}^{n}\theta_i^2\right)}{n(n-1)}$ where i is the generic coalition partner

2. CI 2 $= \dfrac{\sum_{i=1}^{n}(\theta_i - W)^2}{n}$ where W is defined below

3. CI 3 $= \sum_{i=1}^{n} i(\theta_i - W)^2$ where W is defined below

4. CI 4 $= \sum_{i=1}^{n} s_i|\theta_i - W|$ where W is defined below

$$W = \sum_{i=1}^{n}(s_i\theta_i)$$

ALT *Alternation in office*: total share of seats held by parties entering the government plus total share of seats held by parties leaving the government (Strom, 1984). Suppose that there are three parties in the legislature, A, B and C. Their share of parliamentary seats are l_A, l_B, l_C, where $l_A + l_B + l_C = 1$. Cabinet 1 is supported by A and B. Cabinet 2 is supported by B and C. Alternation in office between Cabinet 1 and Cabinet 2 is thus $l_A + l_C$. If between Cabinet 1 and Cabinet 2 elections were held, then share of seats used in the computation of ALT are those of the newly formed legislature.

TPV *Total portfolios volatility* (Huber, 1998). This is the total number of changes in the structure of portfolios allocation between two consecutive cabinets. The procedure for its computation is as follows. Compare the allocation of portfolios between two consecutive cabinets (an outgoing cabinet and an incoming cabinet). This comparison can highlight five different situations. (a) a portfolio is assigned to the same minister who was in charge of it in the outgoing cabinet, (b) a portfolio is assigned to a new minister who belongs to the same party of the outgoing minister, (c) the new minister is not of the same party as the outgoing minister, (d) a portfolio is eliminated, (e) a new portfolio is created. TPV is the total number of cases (b), (c), (d) and (e). Partisan Portfolios Volatility (PPV) is the total number of cases (c), (d) and (e).

IPV *Ideological portfolios volatility* (Huber, 1998). Average ideological distance flown by portfolios between two consecutive cabinets. The procedure for its computation is as follows. Consider the transfers in group (c) above. For each transfer compute the ideological gap between the two parties (the party holding the portfolio in the old cabinet and the party holding the portfolio in the new cabinet). Then compute the simple average of the Euclidean distance for all the transfers. Transfers in group (d) and (e) cannot be included. For those in group (d) the point of arrival of the ideological journey of the portfolio is missing, for those in group (e) it is the starting point of the journey which is missing.

FIRST *First cabinet formed after elections*. Dummy variable taking value 1 if the

cabinet is the first formed of the new legislature.

CARE *Caretaker status*. Dummy variable taking value 1 if the forming cabinet is going to be a caretaker. The classification in Woldendorp et al. (1998) is used to identify caretaker governments.

RFT *Termination for political reasons.* Dummy variable taking value 1 for the forming cabinet if the previous cabinet was terminated because of political reasons. All terminations are considered to be due to political reasons except for those due to illness of the prime minister or non-anticipated elections.

COALC *Coalition continuation*. Dummy variable taking value 1 if the coalition supporting the forming cabinet is the same that supported the outgoing cabinet.

FORM *Duration of the formation process*. Log of days of negotiations over the formation of the new cabinet. Negotiations start with the appointment of the formateur and terminate with the swearing-in ceremony of ministers or the formal investiture vote granted by the parliament.

Dlarge *Large formateur*. Dummy variable coded as 1 if the formateur party is the a largest in the coalition

Dstrong *Strength of the formateur*. Dummy variable coded as 1if the formateur is both the median party in the legislature and the largest party in the coalition. The formateur is the median party if its share of parliamentary seats added to the shares of seats of the parties on its left on the ideological continuum makes the cumulative sum of shares larger than 0.5.

SHS *Share of coalition seats of the formateur*. Number of parliamentary seats controlled by the formateur divided by the total number of seats controlled by the coalition.

DEF *Previous defeat of the formateur*. Dummy variable taking value if the previous cabinet was defeated for political reasons and the formateur in current negotiations held the office of prime minister in that cabinet.

SIZE *Relative size of parties in the coalition.* SIZE = ENP/ANP.

EVEN *Degree of unbalance of the outcome of negotiations*. See technical definition in Paragraph 2.4.3.a of Subsection 2.4.3 of Chapter 2.

INV *Investiture vote*. Dummy variable coded as 1 for those countries where a formal investiture vote is required as the final institutional hurdle before the cabinet can formally enter office. Coding of this dummy is based on Diermeier and Van Roozendaal (1998).

CONT *Continuation rule*. Dummy coded as 1 for those countries where the incumbent cabinet may continue in office without having to resign formally even if elections are held, as long as its supporting coalition is effectively the winner of the electoral contest. Coding of this dummy is based on Diermeier

and Van Roozendaal (1998).

CPG Average rate of growth of the consumer price index over the period of negotiations. Its lagged value CPG*n* is computed as the average rate of change of the consumer price index over the *n* months before negotiations start.

ERG Average rate of growth of the exchange rate index over the period of negotiations. Its lagged value ERG*n* is computed as the average rate of change of the consumer price index over the *n* months before negotiations start.

IPG Average rate of change of the industrial production index over the period of negotiations. Its lagged value IPG*n* is computed as the average rate of change of the consumer industrial production index over the *n* months before negotiations start

3. NEW EVIDENCE ON THE POLITICS AND ECONOMICS OF MULTIPARTY CABINETS DURATION.

> *"If we count cabinets formed since the 25th of April 1943, then the forming Segni cabinet would be the seventeenth; if we start counting cabinets since returning to the capital, 18th of June 1944, then it would be the fifteenth; if we count cabinets since the formation of the first parliament of the Republic (31st of May 1948), then it would be the seventh. Average cabinet duration is about eight months in the first two cases and about one year in the third case. And given that between 1953 and 1954, there were two parliamentary crisis (De Gasperi VIII and Fanfani) where forming cabinets were unable to pass the investiture vote in the parliament, thus subtracting a further spell of two months, then the average duration for the five cabinets effectively in office since 1948 is about one year and four months each. This is exactly the duration of the* [outgoing] *Scelba cabinet. The longest cabinet since 1943 was De Gasperi VII: from the 26th of July 1951 to the 7th of July 1953, for a total time of almost two years. I can at most predict that the duration of this forming Segni cabinet will be included between the about sixteenth months of Scelba cabinet and the 23 days of De Gasperi, so that the current legislature will successfully enter the fifth year of its political life".*
> (Don Luigi Sturzo during the discussion on the vote of investiture of Segni cabinet, 13 July 1955, Italian Senate (Rome). Reported in G. Andreotti *Governare con la crisi*, Rizzoli, 1991, page 86).

A distinctive feature of modern democracies is that parties alternate in office on the basis of the preferences expressed by voters in regularly held general elections. Some degree of cabinet turnover is therefore not only unavoidable, but also necessary to the correct functioning of democratic institutions. Nevertheless, when cabinet durations are excessively short, myopic policy decisions aimed at granting immediate political survival are most likely to be made by the incumbent. For instance, faced with a positive probability of being replaced in the near future by a new government with different policy preferences, the incumbent government has an incentive to issue debt strategically in order to tie the hands of its potential successor (Alesina and Tabellini, 1990 and Tabellini and Alesina, 1990). Alternatively, it has been argued that to maximise its chances of being re-elected, the incumbent can make myopic use of fiscal spending and increase public consumption at the price of lower public investment. In an AK growth framework this reduces the rate of economic growth in the long-run (Darby et al. 2000). Cabinet instability also makes private agents more uncertain about the future course of economic policy (i.e. taxation policy), with the result that private investments would stay below their potential level and economic growth would slow down (Alesina et al. 1996). Other scholars instead focus on the fact that short-lived governments (or governments in office in countries where average duration is short) find it extremely difficult to make a credible commitment to structural reforms. This in turn makes reforms themselves difficult to sustain and, on average, less likely to be successful (Calvo and Drazen, 1996). Drazen (2000) surveys theoretical models that link economic outcomes to government duration. All in all, most contributions in the

political economy literature are concerned with the impact of cabinet survival on the process of economic policy formation and hence the study of what determines survival is of interest to both political scientists and economists.

In this Chapter, I investigate the determinants of cabinet duration in western European coalition systems. Several contributions (although not so many, as noted by Laver and Shepsle, 1998) have already been presented in the literature. However, I believe that my analysis generates some interesting value added. First, unlike most of the previous empirical papers, I make an effort to link the econometric specification to a specific structural framework. In the basic specification, variables enter the statistical model because they provide empirical representation to some given political, institutional or environmental factors incorporated in the theory and not just on the basis of a simple inductive approach. Extended specifications are then estimated, which also include explanatory variables representing factors with *prima facie* relevance to duration. Second, new empirical proxies are constructed to provide a more sophisticated representation to some factors (this is the case, for instance, of polarisation, fragmentation of the coalition, degree to which the existing government agreement can be considered as "balanced"). Third, I estimate the statistical model through a semi-parametric approach developed by Han and Hausman (1990) which overcomes some of the limitations of the traditionally used Partial Likelihood method proposed by Cox (1972 and 1975). This will allow me to gain insights into the underlying distribution of duration data.

The three bits of value added just mentioned translates into a set of innovative results that I briefly anticipate. Other than by factors traditionally recognised as key determinants of duration (e.g. the majority status of the coalition, the effective number of parties in the government, the polarisation of the party system), the probability of a government collapsing depends on the intrinsic stability of the legislature, on the ideological gap between the executive and the median legislator, on the ideological orientation of the cabinet itself and on the general state of the economy. Moreover, graphical evidence suggests that the underlying distribution of duration data might be a Gompertz (or possibly a Weibull) distribution and not certainly an exponential.

The rest of the Chapter is organised as follows. In Section 3.1 I survey the existing literature on government duration. Section 3.2 outlines the theoretical framework for the analysis of government duration. In Section 3.3 I present the statistical model and the estimation method. The statistical model is in fact the Proportional Hazards Model already introduced in Chapter 2 (Section 2.4), thus most of Section 3.3 is devoted to the

description of the estimation procedure and how it compares with Cox's method. Econometric results are given in Section 3.4. Section 3.5 concludes. Appendix A3.1 contains the tables with the full set of econometric results. Appendix A3.2 gives additional details on the theory of Labour Quiescence, which is used to explain the existence of a significant correlation between cabinet duration and cabinet ideological orientation. Appendix A3.3 provides a detailed description of the political variables. Notice that some of the indicators used in this Chapter have already been used in Chapter 2, so that details on their computation can be found in Appendix A2.4 of Chapter 2.

3.1 Government duration in the literature so far

Early contributions in the literature on government duration focus on the empirical analysis of the correlations between a set of structural attributes and observed cabinet durations (see, inter alia, Taylor and Herman, 1971; Warwick, 1979; Strom, 1985 and 1988). The idea underlying this "attributes approach" is that the durability in office of any cabinet is deterministically dependent on features that pertain to the structure (composition, size, fractionalisation) of the ruling coalition and of the party system. That is, the probability of a cabinet surviving in office for any length of time is almost entirely determined by the attributes of the government and of the legislature that ultimately retains the power to make and break this government. This implies that by looking at such attributes one can immediately formulate an accurate prediction over the duration of the incumbent. Typically, the statistical tools used to undertake this analysis are bivariate and multivariate OLS regressions and probit and logit models. The outcome of this analysis is represented by estimated coefficients that provide information on the sign and the statistical significance of the relationship between duration and structural factors. Some interesting results are obtained. For example, Taylor and Herman (1971) show that the fractionalisation of the legislature and the number of parties in the ruling coalition are both negatively correlated with duration. Warwick (1979) finds that minimal winning status and minimal connected winning status positively correlates with duration. He also constructs indices of ideological diversity based on cleavage-spanning coalitions and obtains that they are statistically significant predictors of survival in office. Strom (1985 and 1988) obtains that minority governments tend to last for less time than majority ones and that duration is increasing in the degree of pre-electoral identifiability of the ruling coalition and in the time

required to complete the formation process. This latter result is, however, challenged by Laver and Schofield (1990), who also provide a detailed review of contributions that build on the attributes approach. Additional references can be found in Warwick (1994) and Grofman and Van Roozendaal (1997).

Browne et al. (1984 and 1986) propose an "events approach" which is the antithesis of the attributes approach. They argue that the life of a cabinet must be represented as a fully stochastic process and henceforth that its duration is determined by the occurrence of unpredictable critical events. According to this view, looking for empirical correlations between structural factors and durability in office would be useless, in the sense that it is not through attributes that durability can be explained and predicted.

The idea that government collapses are the result of purely random events is, however, in contrast with the observations that government durations in most western European countries exhibit patterns which are not casual. Warwick (1992) reports that out of 12 western European parliamentary democracies investigated, only 4 effectively shows patterns which are somehow consistent with Browne et al's mathematical model of cabinet dissolutions. Nevertheless, the events approach incorporates the common sense intuition that survival in office might not depend exclusively on a set of deterministic features, but also on the realisation of events that modify the environment and which are not predictable ex-ante. Building on these considerations, King et al. (1990) propose a unified approach where the life of a cabinet is represented as a stochastic process whose termination is affected by both stochastic events and structural factors. As an appropriate statistical tool to represent the systematic impact of cabinet specific attributes on the probability of termination of they identify *event history analysis,* whose basic features can be sketched as follows.

The history of a generic cabinet i is represented as a single spell stochastic process Z_t which takes its values in the discrete space $\{E_0, E_1\}$. At time $t = 0$ (that is, when the cabinet is formed), the process is in state E_0. Transition to state E_1 occurs at time $t = t_i$ and identifies the termination of the cabinet. Technically, t_i is referred to as the *failure time*. Taken a time τ and a spell of length Δ, the conditional probability:

$$(3.1) \quad \lambda_i(t) = \lim_{\Delta \to 0} \frac{P(\tau < t_i < \tau + \Delta \mid t_i > \tau)}{\Delta}$$

is the *hazard rate*. The impact of structural factors can then be accommodated by either (i) assuming that they scale up (or down) the hazard rate or (ii) that they rescale the time axis. In the first case a Proportional Hazards Model specification is obtained:

$$(3.2) \quad \lambda_i(t;\mathbf{z}_i) = \phi(\mathbf{z}_i,\mathbf{b})\lambda_0(t)$$

where $\mathbf{z}_i$ is the set of cabinet i attributes, $\mathbf{b}$ is a set of coefficients to be estimated and $\lambda_0(t)$ is the baseline hazard function for a reference cabinet such that $E(\mathbf{z}) = 0$. Notice that when ϕ is the exponential function, equation (3.2) corresponds to model (2.14) used in Chapter 2 to study the determinants of the duration of cabinet formation process.
In the second case an Accelerated Lifetime Model specification is generated:

$$(3.3) \quad \lambda_i(t;\mathbf{z}_i) = \lambda_0[t\phi(\mathbf{z}_i,\mathbf{b})]\phi(\mathbf{z}_i,\mathbf{b})$$

where all variables have the same interpretation as in equation (3.2).

The parametric estimation of models (3.2) and (3.3) proceeds by specifying a functional form for the baseline hazard function to construct the likelihood function. The formulation of correct distributional assumptions would, however, require knowledge of the underlying distribution of duration data. In the absence of such knowledge, *ad hoc* or incorrect assumptions can be stated which significantly affect the estimates. For instance, based on the analysis of the frequency distribution of duration values in their sample, King et al. (1990) assume an exponential distribution. Warwick and Easton (1992) show that this assumption is probably incorrect: the observed frequency is most likely to be generated by distributions other than the exponential. Fortunately, a semi-parametric method is available in the statistical literature to estimate a Proportional Hazards Specification where ϕ is exponential. This method, developed by Cox (1972 and 1975) does not require any assumption to be made about the functional form of the baseline hazard and for this reason it has become quite popular for applications in economics and political science (see Kiefer, 1988, for a survey). The method is based on the construction of a Partial Likelihood function and details are discussed in some length in Subsection 2.4.1 of Chapter 2.

Warwick (1994) uses the Partial Likelihood method to develop and enhance the unified approach first suggested by King et al. (1990). His analysis confirms the statistical relevance of several structural factors concerning the polarisation of

legislatures and fractionalisation of governments, the ideological diversity of coalition partners, the presence or absence in the cabinet of central parties[1] and the state of the economy. He also finds that the hazard function is increasing over time; that is, the probability that a government will collapse in the near future increases with the tenure in office of that government. The same conclusion is reached by Merlo (1998) for the specific case of post-war Italian cabinets and using an alternative flexible parametric approach for the estimation of the Proportional Hazards Specification. Grofman and Van Roozendaal (1995) study the hazard function in the Benelux and find that for only one of them hazards are effectively rising. In fact, the issue of whether hazards are increasing, decreasing or constant is still an open controversy (see Grofman and Van Roozendal, 1997 and Diermeier and Stevenson, 1999).

Given the state of the art in the literature, two main avenues of research are left open. The first one concerns the estimation method and the possibility of drawing inferences concerning the underlying distribution of duration data. With Cox's method, the partial likelihood is constructed by taking the product over all failure times of the conditional probability that a generic cabinet will fail at some time t_i, given that it has lasted until t_i. In so doing, the baseline hazard function is treated as a nuisance and conditioned out of the likelihood. Han and Hausman (1990) propose an alternative flexible parametric method (different from the one used by Merlo, 1998) in which the logs of the integrated baseline hazard are estimated along with the coefficients **b** of model (3.2). These estimates of the integrated baseline hazard can then be graphically compared with plots of the integrated hazard obtained from well-known parametric distributions in order to gain insights into the underlying distribution of duration data. In this Chapter I thus adopt the Han and Hausman's method.

The second avenue of research is clearly indicated by Laver and Shepsle (1998). What is missing in most of the literature produced so far is a theory-based specification of the set of independent variables. Most contributions, in fact, build on an inductive approach: the set of regressors (the covariates) are chosen on the grounds of prima facie relevance to government survival. Although some considerable empirical success has been obtained with such inductive modelling, a more comprehensive account of government survival can be obtained if the model specification is designed from a theory of cabinet duration. As a matter of fact, in recent times, scholars have engaged in

[1] "Central " parties are, depending on the theoretical context, those located at the median of the distribution of ideological locations in the parliament (see, Van Roozendaal, 1993) or those located in the core of the voting game (see, Schofield, 1986). Warwick finds that the presence of such parties in the coalition does not necessarily increase the duration of the cabinet.

the construction of game theoretic frameworks for the analysis of cabinet turnover in parliamentary democracies (see Lupia and Strom, 1995; Laver and Shepsle, 1996 and 1998; Baron and Diermeier, 1998; Diermeier and Merlo, 1998). The typical model in this area interprets government as the equilibrium outcome of a legislative bargaining process. Such an outcome (which can be represented by a specific distribution of portfolios, partition of patronage or policy proposal) will survive until a shock is produced and parties decide to re-negotiate the original agreement. However, a shock does not necessarily engine a re-negotiation nor does a re-negotiation necessarily generate a new agreement. Whether the status-quo (that is, the existing agreement) survives will depend upon a set of political and environmental conditions. I will make use of a version of the model proposed by Lupia and McCubbins (1998) to identify the necessary and sufficient conditions for the survival of the status-quo and to design, on the basis of these conditions, the empirical specification of the statistical model.

3.2 A theory of government duration in parliamentary democracies.

The following model is based on Lupia and McCubbins (1998). First, I describe the structural set-up and the conditions for the stability of the government equilibrium, and then discuss the empirical representation of the parameters that determine stability.

3.2.1 Structural set-up and conditions for government stability.

Consider a three-party system $N = \{1, 2, O\}$. Relative shares of parliamentary seats for these three parties are denoted by the vector $\mathbf{l} = (l_1, l_2, l_O)$, with $l_i \in (0, ½)$, $\Sigma_{i \in N} l_i = 1$ and $i = 1, 2, O$. Thus, none of the parties controls an absolute majority of seats, but any two-party coalition is winning under majority rule. Let us also assume that parties' ideal policies are represented on a uni-dimensional Left-Right continuum by the vector of cardinal locations $\theta = \{\theta_1, \theta_2, \theta_O\}$: $\theta_i \in [0,1]$, 0 represents extreme-left and 1 extreme-right.

Any party is assumed to care about parliamentary seats *per se* and benefits from holding office. The utility function is thus written as:

$$(3.4) \quad U_i = l_i + u(g_i^j); \quad u' > 0; \; j = 1, 2, O \text{ and } j \neq i; \; g_i^j > 0.$$

Parameter g_i^j denotes the total valuable product that a government agreement between party i and party j will produce, from the point of view of party i. The empirical motivation (and representation) of this term is investigated later. Intuitively, one can imagine that sharing office with party j will produce a stream of benefits for party i (for instance, the possibility to appropriate a share of patronage and/or to affect the process of economic policy formation, the opportunity to deliver economic outcomes that will increase its popularity, and so on). Then, g_i^j represents the discounted value of this stream of expected benefits. Obviously, the corresponding value for party j is represented by a term g_j^i. Notice that g_i^j and g_j^i are not necessarily identical; that is, it is possible that the partnership is valued more by one of the two parties. Furthermore, to the extent that g_i^j is dependent on policy outcomes or on the homogeneity of the policy preferences of the two parties, equation (3.4) incorporates ideological as well as electoralist incentives.

In line with the literature, government is interpreted as the equilibrium outcome of a bargaining process over the partition of the product g_i^j. This partition can be operationalised, for instance, through a specific allocation of key portfolios or the definition of a common policy proposal located at some intermediate point between θ_i and θ_j. Models of bargaining over cabinet formation are investigated in Chapter 2. Here, I take the outcome of that process as given. Formally, let c_i be the quota secured by party i: $c_i \in (0,1)$ and $c_i + c_j = 1$ [2]. The utility of coalition partners i and j can then be written as:

$$\text{(3.5.a)} \quad U_i = l_i + c_i g_i^j \quad \text{and} \quad \text{(3.5.b)} \quad U_j = l_j + c_j g_j^i$$

whilst the utility of the opposition party is simply equal to its share of parliamentary seats.

As suggested by Laver and Shepsle (1998), an appropriate approach to the theoretical analysis of government stability is to assume the existence of a status-quo equilibrium government (that is, an original government agreement) and then identifying under what circumstances such status-quo survives the realisation of critical events (shocks). The type of shock I have in mind is a *public opinion shock* (Laver and Shepsle, 1998 consider other possible types of critical events). At some stage of government life, before the constitutionally established term of office of the legislature

[2] Quotas sum to unity because the value produced by a government partnership is appropriated only (and entirely) by the two parties that participate into this partnership.

expires, opinion polls are released (or local/European elections are held) so that parties can formulate expectations about their likely share of seats and coalition-forming opportunities in case elections were anticipated.

Formally, let $E(l_i^*)$ be the expectation of party i, based on the opinion polls, of its share of seats l_i^* in the hypothetical new legislature. Similarly, $E(c_i^* g_i^{j*})$ is the expectation on coalition-forming opportunities. The overall expected benefit from terminating the current legislature is thus equal to:

$$(3.6)\ b_i = E(l_i^*) + E(c_i^* g_i^{j*}).$$

However, anticipated elections are also assumed to involve an opportunity cost d_i. Later, an empirical interpretation for d_i is offered. The net benefit from terminating the current regime is thus $b_i - d_i$. Notice that the presence of a subscript i on d means that the opportunity cost is not necessarily identical for all parties.

Let the status-quo be represented by a coalition of parties 1 and 2: the total valuable product associated to such coalition is allocated between the two parties with quotas equal to c_1 and $c_2 = 1\text{-}c_1$. As the public opinion shock is realised and expectations are formed, the original government agreement can be re-negotiated. The structure of this re-negotiation process is assumed to be as follows. Party 1 has the right to move first. It can either make no new offer or make a new offer to either of the other two parties. If it makes no new offer, then party 2 has the right to move (see below). If an offer is made, then the party to which this offer is directed can either accept or reject it. If the offer is accepted, then a new equilibrium is achieved. If the offer is rejected, then party 2 has the right to move. Similarly to party 1, party 2 can either make no new offer, or make a new offer to either of the other two parties. If party 2 makes no new offer, then new elections might be called, as long as there is a legislative majority demanding for them. If party 2 makes a new offer, then the party to which such an offer is directed can either reject or accept. If the offer is accepted, then a new equilibrium is reached. If the offer is rejected, then new elections can be called, to the extent that there is a legislative majority demanding so. Finally, bargaining is costly for the two offering parties: each of them pays a cost K_i (in this case $i = 1, 2$). The empirical motivation for this assumption is discussed below.[3]

The possible outcomes of the re-negotiation process are summarised as follows:

[3] The bargaining model is static. For dynamic games of political bargaining see Baron (1998) and Diermeier and Merlo (1998).

1. none of the two offering parties makes a new offer and there is no legislative majority demanding new elections (this is equivalent to no re-negotiation);
2. a new offer is made by at least one of the two offering parties, but it is rejected and there is no legislative majority demanding elections;
3. neither of the two offering parties makes a new offer, but there is a legislative majority demanding new elections;
4. a new offer is made by at least one of the two offering parties, but rejected and there is a legislative majority demanding elections;
5. a new offer is made by one of the two offering parties and accepted,
   (a) the offer is made to the other offering party,
   (b) the offer is made to the opposition party O.

The status-quo is preserved (that is, the original government agreement survives) only in cases 1 and 2. Cases 3 and 4 give rise to an anticipated election. Case 5a generates a reshuffle (that is, an amendment to the existing agreement). Case 5b produces a new coalition. It is worth stressing that reshuffles are here considered as new cabinets: the composition of the ruling coalition does not change, but the structure of portfolios allocation and/or the set of policy proposals that characterise the new government are different from those which characterised the original one.

Lupia and McCubbins (1998) characterise the Subgame perfect Nash equilibrium for this type of games. It turns out that two necessary and sufficient conditions must be jointly met for case 1 or case 2 to occur after a public opinion shock is observed. The first condition is that there must be no legislative majority for which new elections are preferred to the maintenance of the status-quo. The second condition states that both offering parties (1 and 2) must prefer the status-quo to an alternative agreement that does not involve new elections.

The first condition requires that the following inequality holds for at least two parties in the system:

$$(3.7) \quad b_i - d_i < l_i + c_i g_i^j$$

On the l.h.s. of (3.7) is the net expected benefit for party i from terminating the current legislature. On the r.h.s. is the utility of party i in the status-quo. Notice that, being the status-quo represented by a coalition of party 1 and 2 with quotas c_1 and c_2 respectively, the term on the r.h.s. is equal to $l_1+c_1g_1^2$ for party 1, to $l_2+c_2g_2^1$ for party 2 and to l_O for the opposition party O. Any party for which (3.7) holds will prefer

preserving the existing government to anticipated elections. If there are at least two parties (any two parties) for which this is true, then no legislative majority can be formed that demands new elections.

The second necessary and sufficient condition for the survival of the existing government agreement is met if and only if no offering player prefers the best acceptable offer it can make to sustaining the agreement. The best acceptable offer a player *i* can make to a player *j* is a quota $c_j = 1 - c_i$ of g_i^j such that player *j* is indifferent between accepting or rejecting it. Given the two-stage structure of the re-negotiation process, the best possible new agreement that does not involve new elections for any of the offering players is one where a coalition is formed by this offering player with the opposition party and the offering player gets almost the whole of the valuable product associated with that coalition. Thus, the second condition for survival is met iff:

$$(3.8)\quad (1-\varepsilon)g_2^O - K \leq c_2 g_2^1 \quad \text{and} \quad (1-\varepsilon)g_1^O - K \leq c_1 g_1^2$$

where ε is a small positive constant.

In the end, given the structure of the re-negotiation game, the probability of the two necessary and sufficient conditions for the stability of the government equilibrium being met increases when (i) the value of the ruling partnership is higher (g_i^j on the r.h.s. of equation (3.7) and g_1^2 and g_2^1 on the r.h.s of equation (3.8)), (ii) net benefits from ending the current regime are lower ($b_i - d_i$ on the l.h.s. of equation (3.7)), (iii) bargaining costs are greater (K on the l.h.s. of equation (3.8)) and (iv) the agreement with the outsider party does not produce a significant value for any of the two insiders (g_1^0 and g_2^0 on the l.h.s. of equation (3.8)). To obtain testable predictions from these propositions it is necessary to give an empirical motivation for the parameters g_i^j, K, d_i.

3.2.2 Empirical representation and testable predictions from the theoretical model.

3.2.2.a The total valuable product expected from the government agreement (g_i^j)

Lupia and McCubbins (1998) suggest that the benefit g_i^j from a partnership between *i* and *j* depends on the homogeneity of the policy preferences of the two partners and on the economic conditions realised during the term of office. Complementarity of interest is likely to generate higher utility for coalition partners since it facilitates the definition of common policy proposals and/or reduces the

possibility that stalemates will delay the process of policy formation. Positive economic conditions instead increase the support for the incumbent amongst voters and, at least to some extent, represent the achievement of a primary goal for any government concerned with the welfare of the society. Since a higher g_i^j makes it more likely that conditions (3.7) and (3.8) are met, two testable predictions are obtained. The first states that more fragmented coalitions produce less stable governments. The second states that better economic conditions reduce the probability of a government collapsing.

To represent ideological heterogeneity of coalition partners, I will make use of the variable CI already introduced in Section 2.4 of Chapter 2 and whose computational details are given in Appendix A2.4 of that same Chapter. CI is basically a measure of the dispersion of the policy locations of all parties in the coalition. Four different versions of the same variable are presented in Appendix A2.4, the difference among them being essentially related to the fact that one is computed as a simple variance of locations, whilst the other three are weighted averages of the Euclidean gap between a generic party's location and the median of the distribution of the locations of all coalition partners. An alternative measure of fragmentation is the effective number of parties in the coalition ENP. Again, this has been introduced in Chapter 2 and defined in Appendix A2.4. A larger effective number of parties indicates that the potential for intra-coalition disagreement is higher, thus reducing the value of the partnership for each partner. CI and ENP appear to be positively correlated and hence they should not be added jointly to the set of regressors. In the empirical analysis, I make use of CI in the basic specification and comment on what changes when it is replaced by ENP. In the extended specifications I will instead use ENP, since CI happens to be positively correlated with most of the additional regressors considered.

An empirical concept related to CI is the one of ideologically connected coalitions, originally proposed by Axelrod (1970). Suppose to order parties from Left to Right on the hypothetical ideological continuum. Then, a ruling coalition is ideologically connected if it includes only parties that lay one next to the other on that continuum, without that any gap is observed. So, for instance, if there are four parties (A,B,C and D) and the ordering from left to right is A-B-C-D, then a coalition of B and C is ideologically connected whilst one of A and C is not. Notice that an ideological connected coalition cannot be formed without the participation of the median party. The median party is that party whose share of seats added to the share of seats of the parties on its left (or right) makes the cumulative sum of shares larger than the majority threshold. So, if shares are $l_A = 0.2$, $l_B = 0.25$, $l_C = 0.15$ and $l_D = 0.4$ and the ordering is

A-B-C-D, then C is the median party. Thus, if the total valuable product generated by the government agreement is higher the more similar the interests of the partners are, then coalitions that do not include the median party (being necessarily unconnected) should survive for a shorter period; that is, the presence of the median party should have a duration-increasing effect. To capture this effect, a dummy MED is defined that takes value 1 if the median party is a member of the ruling coalition. In addition to this, a dummy MEDPM is coded as 1 if the median party is included in the coalition and holds the office of prime minister. The empirical motivation of MEDPM is analogous to the one just stated for MED, with the difference that now the duration-increasing effect is assumed to be generated only if the median party formally plays a key role in the cabinet.

To represent the state of the economy I consider measures constructed from two simple indices: the industrial production index and the consumer price index. The motivation for that choice is that most political economy models take high production and low inflation as indicators of positive economic conditions (see for instance the survey of models in Chapter 2 of Alesina et al. 1997). Moreover, it is to employment (to which production is positively correlated) and inflation that voters and hence politicians usually look when forming an opinion of how good or bad the economic situation is. Finally, for both indices sufficiently long and comparable monthly time series are available from the IMF and the OECD data-sets. This is not the case, instead, for other indices (such as the rate of employment) which could equally provide an empirical representation of the state of the economy. IPG and CPG are respectively the average monthly growth rate of the industrial production index and of the consumer price index over the life of a cabinet. CPGG is instead the average growth rate of CPG and CPGVOL is the standard deviation of monthly CPG. Since good economic conditions increase g_t^j and a higher g_t^j increases the probability that conditions (3.7) and (3.8) are met, IPG should correlate positively with duration, whilst CPG, CPGG and CPGVOL should correlate negatively.

In addition to fragmentation of the coalition and state of the economy, I argue that the stream of benefits expected from a government partnership depends upon the nature of the government. More specifically, given their limited political agenda, caretaker governments are likely to produce a smaller total valuable product from the point of view of parties. Moreover, caretakers are often formed in the proximity of elections and hence it is known ex-ante that their duration will be short. To account for this caretaker-effect, I define a simple dummy CARE coded as 1 if the incumbent is explicitly of a

caretaker nature. Then, the expectation is of a negative correlation between the caretaker status and survival.

3.2.2.b The opportunity cost of ending the current regime (d_i)

For any given realisation b_i of the public opinion shock, the probability that parties will decide to terminate the current regime is higher, the smaller the opportunity cost d_i. Building on an argument first proposed by Lupia and Strom (1995), one can assum that this opportunity cost decreases as the constitutionally established election date approaches. This time-dependent path of d_i is explained by its twofold empirical motivation. On the one hand, it incorporates all the costs connected to electoral campaign. On the other hand, it reflects the political cost of dissolving the legislature before its constitutional mandate has expired. Such a cost is smaller, however, when the constitutional deadline is closer (eventually, it would drop to zero when elections are not anticipated). Given that the costs of campaign must be paid independently from the fact that the election is anticipated or not, the conclusion is that d_i is larger the earlier elections are held. This has two implications. First, a cabinet formed earlier in the legislature should last longer. Second, the underlying distribution of duration data should display rising hazards. The first implication can be tested by adding a dummy FIRST (coded as 1 if the cabinet is the first formed of a new legislature) to the set of regressors. The second may be tested by looking at the curvature of the integrated hazard function that best approximates the plot of the estimated integrated baseline hazard obtained from the flexible parametric procedure proposed by Han and Hausman (1990). Evidence on both predictions will be discussed in Section 3.4. [4]

3.2.2.c The cost of bargaining (K)

Engaging in the re-negotiation of the status-quo agreement can be costly for parties in the ruling coalition if the opposition is numerically large and ideologically homogenous and hence potentially able to get into power. This cost is incorporated in the model through the parameter K. Thus, the empirical representation of K should look at two aspects: the size of the opposition and its degree of ideological fragmentation.

[4] Ideally, one could also provide an empirical representation for b_i by using exit polls data on share of seats. In fact, exit polls data are not available for a sufficiently long spell for all the countries in the sample. Moreover, this representation would be only partial since b_i also incorporates office-sharing opportunities.

The former is the counter-part of the size of the coalition, whose empirical representation is discussed below. The latter is captured by the variable "opposition concentration", OPP, originally defined by Strom (1990). Details on the technical computation of OPP are given in Appendix A3.3. Large values of OPP are observed in situations where most of the opposition parties are located on the same side of the ideological Left-Right continuum, so that the opposition constitutes a connected block. Higher values of OPP thus represent a greater cost of bargaining for insider parties (that is parties in the ruling coalition) and this should in turn enhance stability.

3.2.2.d The value of agreement with outsiders, (g_1^0 and g_2^0).

It has been argued above that the total valuable product generated by a government agreement is increasing in the degree of ideological homogeneity of the parties participating in that agreement. Thus, the smaller the average distance between parties in the legislature (polarisation), the larger the expected stream of benefits yielded by a partnership between any two (or more) of such parties. The value of the alternative agreements g_1^O and g_2^O is therefore higher in less polarised societies. Since higher g_1^O and g_2^O increase the probability that condition (3.8) is not met, one can conclude that stability is enhanced in more polarised systems. The variables POL2 and POL3, already introduced in Chapter 2 and described in Appendix A2.4, are used to account for this effect. They measure the average Euclidean gap between any two parties on the ideological continuum and the overall dispersion of the locations of all parties with parliamentary representation respectively. It is worth stressing that this definition of polarisation is different to the one commonly used in the literature, which is originally due to Powell (1982). According to Powell, polarisation is empirically defined as the share of support for extremist parties and measures the relative importance of the extremes of the political spectrum relative to the centre. The indicator POL1 (again, details on its computation can be found in Appendix A2.4) builds on this definition and it will be added to the basic specification. However, as an indicator of the overall degree of complexity of the political environment, POL1 is expected to reduce duration in office.[5]

[5] For a discussion on the role of numerical fragmentation of the parliament as a whole see Section 3.4 below.

3.2.2.e The size of the ruling coalition (s_1 and s_2)

In the literature it is normally argued that the majority status of the coalition should guarantee more stability to the cabinet. As a matter of fact, under majority rule, the incumbent supported by a coalition controlling more than 50% of total parliamentary seats cannot be beaten unless the coalition collapses because of some internal dispute. A minority government must instead continually rely upon the support from outsiders in order to survive legislative challenges. Empirical results in Strom (1985 and 1990) provide support for the view that the majority status correlates positively with duration.

In the theoretical model of Subsection 3.2.1 the share of seats controlled by coalition partners enters only condition (3.7). For any realisation of the public opinion shock, the probability that a party prefers the status-quo to a new regime is increasing in its share of seats. One might then be tempted to conclude that the larger the coalition, the more stable the cabinet. However, because both parties in the coalition must prefer the status-quo to the new regime, a cabinet supported by a coalition of one very large party and one very small party is *ceteris paribus* less stable than one supported by a coalition of the same size that includes two parties of relatively equal size. This implies that "the larger the better" is not necessarily the case: in addition to coalition size, individual partners size also matters[6].

Equation (3.7) is also useful to investigate the role of the numerical size of the opposition. Again, one could think that a larger opposition necessarily represents a bigger threat to the stability of the cabinet. This is the counter-part of the argument that larger governments last longer. But as the share of the opposition increases, its utility in the status-quo also increases and this makes it less likely that party O will demand new elections. A situation can be imagined where a large insider and a large outsider form a coalition to prevent the ending of the current regime thus preserving the status-quo. That is, exactly as larger coalitions might be less stable if parties hold significantly different shares, a larger opposition not necessarily reduces stability when parliamentary seats are valued *per se* by all parties in the legislature.

All in all, the theory broadly suggests that majority governments should last longer, but it is not clear whether the relationship between size and duration is effectively

[6]Diermeier and Merlo (1998) construct a model of cabinet survival where only minority governments terminate before the expiration of the parliamentary term. However, in their model, majority (minimal winning and surplus) governments do reshuffle; that is, they re-negotiate the existing agreement. In Diermeier and Merlo's framework, these reshuffles are not interpreted as cabinet terminations and hence the conclusion is obtained that majority governments survive longer.

linear. For this reason I use the dummy MAJ coded as 1 for majority governments as explanatory variable instead of SH, the total proportion of seats controlled by the ruling coalition. In addition to this, the set of explanatory variables will also include the variable SIZE that measures the degree to which parties in the same ruling coalition are of comparable size. According to the theoretical argument, both MAJ and SIZE should increase duration. Computational details on SIZE are given in Appendix A2.4.

3.2.2.f Institutional arrangements.

In the theoretical model of Subsection 3.2.1, any two-party coalition can demand new elections before the expiration of the parliamentary term. This is equivalent to assuming that the legislature can dissolve itself. Furthermore, since the ruling coalition can equally demand new elections, in the model the government too has the power to dissolve the legislature. Finally, the negotiation of a new agreement automatically terminates the status-quo. This means that the cabinet must resign when receiving a no-confidence vote (that in the model is always constructive).

Not all countries in the sample are characterised by these institutional arrangements. That is, the theoretical model builds on a set of assumptions concerning the institutional setting which are not necessarily consistent with the actual institutional settings observed in the countries of the sample. This in turn might affect the significance and the interpretation of empirical results. One possibility is to exclude from the sample those countries which effectively have different institutions. Alternatively, and this is the approach I follow, one can insert country-specific institutional dummies in the basic specification and see whether they have any significant role in determining duration and if their exclusion alters any of the estimated coefficients on the other variables. To this purpose, the dummy LEG is coded 1 for the countries in which the legislature can dissolve itself, the dummy GOV is coded 1 for the countries where the government can dissolve the legislature and the dummy RES is coded 1 for the countries where the government must resign when receiving a no confidence vote.

3.2.2.g The stability of the legislature

Previously I argued that the political cost of anticipated elections is higher the earlier this elections are held relative to the constitutionally established maximum term

of office of the legislature. This political cost arises because anticipated elections are perceived as a distortion of the normal functioning of democratic institutions and hence make voters more sceptical of politics and politicians. More generally, anticipated elections signal an unsatisfactory performance of the political system as a whole. Of course, different parties could evaluate this political cost differently, depending, for instance, on their anti or pro-system characterisation. That is why the parameter d in the model bears a subscript i. However, I also argue that, *ceteris paribus* and for all parties, the political cost of dissolution depends upon the frequency of anticipated elections. That is, in countries where early elections are relatively frequent and the average life of a parliament is short, the political cost of changing regime is likely to be lower, for any given length of the spell over which elections are anticipated. Intuitively, political costs of anticipated dissolutions arise just because anticipated dissolutions are "off the equilibrium events" that alter the regular pattern of politics. But as these events become more and more frequent, agents tend to perceive them as expressions of the normal political cycle and the motivation for the existence of associated political costs vanishes.

Two empirical indicators can be designed to capture this effect. The first is the country average rate of survival of the legislature (VIV). The rate of survival is defined as the number of days a legislature lasted as a proportion of the maximum time between two mandatory elections. In the computation of VIV, all legislatures but the current one are included (the current one is excluded to avoid possible joint endogeneity with the duration of the incumbent government). The second proxy is simply the number of non-anticipated elections as a proportion of the total number of electoral contests in a given country (ANT). Both ANT and VIV are higher when anticipated elections are less frequent and hence they should be associated with longer durations. Since the two measures are strongly correlated, they cannot be added jointly to the set of regressors. I will present estimates when VIV (which has a better statistical performance) is used and comment on what happens when it is replaced by ANT.

3.3 A flexible semi-parametric procedure for the estimation of a Proportional Hazards Model of cabinet duration.

The statistical model used for the analysis is the Proportional Hazards Specification discussed in Section 3.1:

$$(3.2) \quad \lambda_i(t;\mathbf{z}_i) = \phi(\mathbf{z}_i,\mathbf{b})\lambda_0(t)$$

where $\mathbf{z}_i$ is the set of values taken by the empirical measures defined in Subsection 3.2.2 when cabinet *i* is in office.

As previously noted, most of the literature estimates model (3.2) by the semi-parametric approach proposed by Cox (1972 and 1975). With such a method, the baseline hazard function is treated as a nuisance and conditioned out of the likelihood. Han and Hausman (1990) propose an alternative flexible parametric approach that generates estimates of the baseline hazard jointly with those of the parameters in **b** [7]. Here, I use this alternative approach, whose basic features are described below.

Observations are taken in the form of failure times over discrete periods, t = 0,1,2...., T. The function ϕ in model (3.2) is assumed to be exponential (as in Cox's formulation), so that the Proportional Hazards Model can be re-written as:

$$(3.9) \quad \lambda_i(t;\mathbf{z}_i) = \lambda_0(t)\exp(-\mathbf{z}_i\mathbf{b})$$

In (3.9) the baseline hazard is non-parametric; that is, no assumption must be formulated over the functional form of the baseline hazard.
If $\mathbf{z}_i$ is not time-dependent[8], then specification (3.9) can be expressed in linear form as:

$$(3.10) \quad \delta_t = \mathbf{z}_i\mathbf{b} + \varepsilon_i$$

where $\delta_t = \ln \int_0^t \lambda_0(t)dt$ is the log of the integrated baseline hazard.

The above interpretation of the Proportional Hazards Model as a linear model for a transformed dependent variable is possible only because, with $\mathbf{z}_i$ not time-dependent, the term ε_i has a completely specified distribution which is independent of $\mathbf{z}_i$, **b** and λ_0. This distribution takes an extreme value form:

$$(3.11) \quad \Pr(\varepsilon < E) = \Pr\left[\ln \int_0^t \lambda_0(t)dt < E + \mathbf{z}_i\mathbf{b}\right] = \exp(-\exp(\varepsilon))$$

[7] The approach proposed by Han and Hausman (1990) also overcomes some technical drawbacks of the Cox's approach concerning the treatment of discrete data, of tied failure times and of observable heterogeneity.

[8] Most of the variables in the econometric specification of next Section are indeed constant over the life of a cabinet. For those which are not (such as the economic variables), period averages are used.

From (3.11), the probability of failure at time t by cabinet i is:

$$(3.12)\quad \Pr[\tau_{t-1} < t_i < \tau_t] = \int_{\delta_{t-1}-\mathbf{z}_i\mathbf{b}}^{\delta_t-\mathbf{z}_i\mathbf{b}} f(\varepsilon)d\varepsilon$$

Equation (3.12) can thus be used in the construction of the likelihood. To this purpose, a dummy y_{it} must be defined that takes value 1 if failure in period t occurs for cabinet i and 0 otherwise. Then, the log-likelihood is:

$$(3.14)\quad \log L = \sum_i \sum_t y_{it} \log \int_{\delta_{t-1}-\mathbf{z}_i\mathbf{b}}^{\delta_t-\mathbf{z}_i\mathbf{b}} f(\varepsilon)d\varepsilon$$

Since ε_i has an extreme value distribution, the log-likelihood (3.14) is of an *ordered logit form*. This ordered logit specification can be very closely approximated by an *ordered probit form*. However, the ordered probit requires ε_i to have a standard normal distribution and therefore it does not strictly follow from (3.9) and (3.10). Notice also that the log of the integrated baseline hazard, δ_t, is not conditioned out of the log-likelihood, but is instead estimated along with the **b** coefficients. These estimates of δ_t will be useful in making inferences about the underlying distribution of duration data. In case of right censoring of some observations, the log-likelihood will also include a term which specifies the cumulative probability of not failing at the time the observation is censored.[9]

The log-likelihood (3.14) is maximised through an iterative procedure. Han and Hausman (1990) show that under suitable regularity conditions, the usual asymptotic properties of the maximum likelihood estimator hold.

3.4 Econometric results

The sample consists of thirteen western European coalition systems: Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway and Sweden. The sample periods is 1950-1995, for a total of 345

[9] Right-censoring of cabinet duration data typically occurs when the cabinet terminates because mandatory (non-anticipated) elections have to be held or because of illness of the prime minister.

cabinets (single-party as well as coalition cabinets are included [10]). The statistical model is specified as in equation (3.9). Notice that, contrary to the formation duration analysis of Chapter 2, here a positive estimated coefficient on a given explanatory variable indicates that higher values of that variable increase duration.

Cabinet duration is measured according to the criteria specified in Woldendorp et al. (1998) and covers the whole spell between the formation of the incumbent and the formation of its successors. That is, duration includes the period of time after the formal resignation of the incumbent prime minister and until the incoming cabinet formally enters office. This is because during that period, the outgoing government usually stays in power, albeit with only caretaker powers. Country-average durations (in days) and some additional basic summary statistics are reported in Table A3.1 of Appendix A3.1.

3.4.1 Basic specification.

The basic specification of model (3.9) includes the political variables described in Subsection 3.2.2 above. The theory predicts that the estimated coefficients on MAJ, MED, MEDPM, POL2 (or POL3), VIV, FIRST, OPP and SIZE should be positive, whilst those on CI (or ENP), POL1 and CARE should be negative. Estimates are reported in Column 1 of Table A3.2 of Appendix A3.1. Only the variable POL2 displays a coefficient whose sign is not consistent with theoretical predictions. This same coefficient is, however, not statistically different from zero at usual confidence levels. The same result holds when POL3 is used.

The majority status of the coalition, its degree of ideological heterogeneity, the electoral importance of extremist parties and the past observed stability of the legislature are all relevant determinants of duration and they work in the direction predicted by the theory. In addition to this, the first cabinet formed in a new legislature effectively lasts longer than subsequent cabinets, whilst caretaker governments experience significantly shorter durations. Interestingly, differences in institutional arrangements concerning the allocation of the power to dissolve the legislature or the possibility for the government to stay in office even after a no-confidence vote do not

[10] Most contributions in this field include single-party governments to maximise the number of observations in the sample (e.g. Warwick, 1992). I decided to do the same to make my results comparable with those already reported in the literature. However, the theoretical model to which I refer concerns coalitions (although it can be extended to account for the formation of single-party governments). I therefore re-estimated the Proportional Hazards Specification using the sample of coalitions (about 250 observations). These additional estimates, which are available upon request, show that results discussed in this Section do not depend critically on the inclusion/exclusion of single-party observations.

have a statistically relevant impact. When the model is re-estimated dropping the three institutional dummies, the estimated coefficients on the other political variables are almost unchanged.

To verify how robust the results in Column 1 are, I performed some sensitivity analysis by altering the specification of the r.h.s. of the model. First, I considered all the four definitions of CI and always obtained the same result: ideological diversity does matter, especially when measured as the weighted average Euclidean gap between the location of a generic partner and the median of the locations of all partners (see Appendix A2.4, definition 4 of CI). Moreover, when CI is replaced by ENP, this latter displays a negative coefficient which also passes a zero restriction test at usual confidence levels. Thus, fragmentation of the coalition does matter, whether measured in ideological or numerical terms. However, when CI and ENP are added jointly, standard errors of estimated coefficients grow considerably. This could be due to a multicollinearity problem. Second, I replaced the continuous variable SIZE with a dummy SZ that takes value 1 if SIZE is above the country average. I also constructed joint terms MAJ*SIZE and MAJ*SZ to isolate the case of majority governments composed of parties of almost equal size. Neither SZ nor the joint terms ever display a coefficient different from zero, whilst the coefficient on MAJ is unaffected. Moreover, when added instead of MAJ, the variable SH plays no significant role. This pattern of results suggests that the majority status really makes a difference in terms of duration, independently from the fact that parties holds relatively equal shares of seats or not, but that not necessarily governments supported by surplus coalitions last longer than those supported by bare majority ones. Third, I replaced FIRST by the time horizon to next scheduled elections at the time of cabinet formation. The estimated coefficient on this latter is positive and statistically significant, whilst those on the other variables are largely unchanged. Thus, cabinets formed earlier in the legislature survive longer, as should be the case when the opportunity costs of anticipated elections decrease over time. Fourth, the variable ANT used instead of VIV displays a positive coefficient, as predicted by the theory. Its inclusion does not significantly alter any of the other results. Since the statistical performance of VIV appears to be stronger (its estimated coefficient is significant at the 1% level of confidence whilst the one on ANT is significant at slightly more than the 5%), I report results when VIV is used. All the results that I present below are qualitatively identical when ALT replaces VIV; the only difference is a small decrease in the value of the Log-Likelihood.

In Column 2 of Table A3.2, the basic specification is re-estimated using ENP instead of CI and dropping SIZE. This will be used as the starting point for the construction of a few extended specifications that include variables in addition to those discussed in Subsection 3.2.2. I choose to use ENP instead of CI because some of these additional variables happen to be heavily correlated with CI. As a consequence of this choice I have to drop SIZE, which strongly correlates with ENP. However, as noted above, there is no evidence that SIZE significantly alters duration and hence its exclusion from the models should not have dramatic consequences. Qualitatively, the estimates in Column 2 do not differ from those in Column 1: the sign and significance of coefficients on all the variables is unaffected whilst the value of the log-likelihood increases. The chi-squared statistic reported at the bottom of the table is now slightly lower, but still large enough to reject the null hypothesis H_0: $\mathbf{b} = 0$ at the 1% confidence level. This result can be interpreted as an indicator of model adequacy (see Kiefer, 1988 for discussion of model adequacy in event-history analysis).

3.4.2 Extended specifications

Extended specifications include, in addition to the variables discussed in Subsection 3.2.2, a set of variables that account for factors not directly incorporated into the model of Subsection 3.2.1, but for which some theoretical link with duration can be identified.

Strom (1988) suggests that lagged duration is positively correlated to current duration through some sort of contagion effect. One could in fact argue that the total valuable product g_t^j of a government agreement increases, from the point of view of the two partners, with the expected survival of the agreement itself. This idea is consistent with the hypothesis advanced by Strom (1985) that duration in office is one of the key measures of government performance. If expectations over the duration of the forming cabinet are adaptive in the sense that they are based on the duration of the past government(s), then lagged duration increases current duration by increasing the expected stream of benefits from the current partnership, and hence by making it less likely that the two insider parties will want to terminate the status-quo.

Merlo (1998) argues that the expertise in office accumulated by coalition partners as well as by the prime minister should reduce the hazard of the incumbent. The idea is that surviving the occurrence of critical events is a learning-by-doing activity and hence coalitions and prime ministers which have been frequently put to the test in the past have a greater chance of lasting when public opinion shocks (or any other form of

shock) occurs. To measure the accumulation of expertise I use two indicators originally proposed by Merlo: COAL is the total duration of all previous governments supported by the same coalition that supports the incumbent, PM is the total duration of all previous cabinets headed by the same prime minister heading the incumbent.

Lagged duration, COAL and PM are added to the basic specification in Column 3 of Table A2.2. Estimated coefficients on all the three variables are all largely insignificant at usual confidence levels, whilst coefficients on the variables of the basic specification are qualitatively unchanged. These findings are consistent with those reported by Merlo (1998) for the specific case of Italy.

In Column 4, the basic specification is extended to include an indicator of the ideological location of the ruling coalition. Intuitively, there are two reasons why ideology could be considered as a determinant of duration. First, the political colour of the coalition affects the content of the economic policies promoted by the government. For instance, it is often argued that governments choose different points on the production/inflation trade-off depending on the ideological location of the parties composing the coalition. To the extent that the state of the economy affects the survival in office (through its impact on the value of the government partnership) ideological differences can contribute to higher or lower cabinet stability. Second, unions tend to have a more quiescent attitude towards left-oriented governments. This in turn means that labour disputes will be less tough and that the terms of the inflation/employment trade-off will be more favourable for the left-oriented government. More relaxed labour relations and the possibility of promoting growth at lower inflation costs should then translate into higher cabinet stability. The bulk of this theory of labour quiescence (Cameron, 1984) is formalised in Appendix A3.2.

To measure the location of the ruling coalition, I make use of the data contained in the Left-Right policy scales described in Appendix A1.1 of Chapter 1. Given the cardinal location of any coalition partner, the overall location of the coalition on the Left-Right policy scale (LOC) is obtained as the weighted average of individual parties' location, with weights equal to the share of coalition seats held by each party (see Appendix A3.3 and Chapter 4 for further details). From the continuous variable LOC, a dummy DLOC is obtained which takes value 1 if LOC is to the right of the median value 5.5. That is, DLOC separates coalitions in left-oriented (to the left of 5.5) and

right-oriented (to the right of 5.5).[11] If left-oriented coalitions effectively generate longer-lasting cabinets, then the coefficient on LOC (or DLOC) should be negative. In fact, this turns out to be the case. In column 4, LOC displays a negative and significant coefficient (the same result holds when DLOC is used) and the results on the variables of the basic specification are qualitatively unchanged. The only relevant innovation is represented by a change in the sign of the estimated coefficient on POL2, which now becomes consistent with the ex-ante theoretical prediction, but still does not pass a zero restriction test.

It has been argued in Subsection 3.2.2.a that governments should be more stable when the ruling coalition includes the median party (or eventually, when the median party controls the office of prime minister). This argument is consistent with the theory of "central" parties (Van Roozendaal, 1993) and with the centripetal tendencies of most of game theoretic accounts of coalition bargaining (see, inter alia, Laver and Schofield, 1990 and Laver and Shepsle, 1996). However, the two dummies used to represent this effect, although displaying the expected positive coefficient, do not appear to play any significant role in determining duration (not even when inserted one at the time on the r.h.s. of the statistical model). To shed additional light on this point, I construct a measure of the ideological gap between the median party and the government (GAP). GAP is operationalised as the Euclidean gap between the location of the median party on the ten points Left-Right scale and the location of the government (see Appendix A3.3 for further details). The location of the government is computed as the weighted average of the locations of all parties in the ruling coalition. Two system of weights are proposed. The first one is the same used for the variable LOC above; that is, a party's weight is given by its share of coalition seats (GAP1). The second one is based on the assumption that the decision making process within the cabinet is characterised by a strong departmental character (see Subsection 2.2.1 of Chapter 2), so that each party's weight is equal to its share of key portfolios (GAP2).

Column 5 reports the estimates of the extended specification that includes GAP2. It appears that the gap between the location of the cabinet and the location of the median party does alter cabinet survival in the expected direction. When GAP1 replaces GAP2, its coefficient remains negative, but the standard error significantly increases. These

[11] Notice that empirical policy sales are defined over a ten points scale, with 1 as extreme left and 10 as extreme right. The threshold 5.5 divides the continuum into two sections of identical length: the Left and the Right of the political spectrum.

results hold independently from the inclusion of MED and MEDPM. Furthermore, with the exception of those on the three institutional dummies (which are, however, largely insignificant), the coefficients on the other political variables are relatively stable.

In Column 6 I introduce a variable that accounts for the degree of unbalance of the government agreement (EVEN). The technical definition and the determinants of EVEN have been investigated in Subsection 2.4.3 of Chapter 2. The motivation for its inclusion here is again based on the conditions for the stability of the status-quo agreement derived in the theoretical model of Subsection 3.2.1. More specifically, the model assumes that the allocation of the total product g_1^j is exogenously imposed and represented by the quotas c_1 and $c_2 = 1 - c_1$. This partition does have an impact on the probability that conditions (3.7) and (3.8) are met, since it affects the status-quo utility of the two insiders. Consider, for instance, a partnership that produces a great valuable product, but where one of the two partners appropriates a large share of such product (i.e. c_1 is large relative to c_2). Then, when the public opinion shock is realised, the probability that the less favoured party (i.e. party 2) wants to terminate the current regime and/or form a coalition with the outsider party are *ceteris paribus* higher. In general, for any value of the total product g_1^j, a more balanced partition of the cake should ensure the cabinet greater stability.

Consistent with the theoretical models discussed in Chapter 2, the partition of the cake can be operationalised through the control of key portfolios the allocation of the whole set of portfolios, or the definition of a common policy proposal. In the first case, it will be unbalanced if the location of the government, computed using share of key portfolios as weights, is relatively distant from the median of the distribution of all locations. In the second case, the partition is unbalanced if parties receive shares of portfolios that are significantly different from their share of coalition seats. In the third case, partition is unbalanced if the ideological location of the government, computed using shares of coalitions seats as weights, is relatively distant from the median of the distribution of all locations. To represent the first two cases, the measures EVEN2 and EVEN3 introduced in Chapter 2 (see equations (2.24.b) and (2.25.a)) can be used. To represent the third case, the variable EVEN5 is constructed as:

$$(3.15) \quad EVEN5 = \left| \theta_M - \sum_{i=1}^{n} (s_i \theta_i) \right|$$

where θ_M is the median of the distribution of the locations of all coalition partners, θ_i is the cardinal location of generic coalition partner *i*, *n* is the number of partners in the coalition, s_i its the share of coalition seats of generic party *i*, and absolute values denote Euclidean distances.

The three measures of unbalance are correlated and hence they should be inserted one at the time on the r.h.s. of the model specification. According to the argument just outlined, the coefficient on any of the three measures should be negative (more unbalanced governments are less stable). This is effectively the case, but the coefficient is not statistically different from zero at usual confidence levels (this result is showed in table for the definition EVEN5, but it holds for the other two definitions). Henceforth, the empirical evidence does not support the hypothesis that the stability of the government agreement depends on the degree of balance of such an agreement.

In Column (7) I address the issue of how the duration of the cabinet formation process affects the subsequent duration in office of the cabinet. As noted when discussing the state of the art in the literature on cabinet duration, the evidence on this point is quite ambiguous. Strom (1990) suggests that longer negotiations would produce a well-built and more complete agreement which is therefore more resistant to the appearance of critical events. Laver and Shepsle (1990) instead argue that the duration of the bargaining process is an indicator of the complexity of the bargaining environment (and, I would add, of the ideological differences among partners) and hence it should correlate negatively with duration.

The analysis of the determinants of the duration of the formation process undertaken in Chapter 2 (Subsection 2.4.1) shows that several of the variables included in the basic specification are strongly correlated with FORM (the duration of the process of formation in days). As a matter of fact, when added, FORM determines a significant increase in the standard error of almost all estimated coefficients. Thus I decide to re-estimate a parsimonious specification, which is reported in Column (7). The result is a clear positive effect of the formation time on cabinet stability. Thus it seems that long negotiations effectively produce a better specified government agreement.

A final word should be said on the role of the fractionalisation of the legislature. This is a factor which has received some attention in the literature so far (see Grofman and Van Roozendaal, 1997). The variable POL2 in the basic specification does account for the ideological fragmentation of the party systems. To account for numerical fragmentation, the traditional effective number of parties in the parliament (FRA) could

be used. In fact, when added to the basic specification, FRA does not produce any relevant change. Not even when POL2 and CI (or ENP) are dropped does the negative coefficient on FRA become significant. Interestingly, it does become significant, although only at the 10% confidence level, when VIV is excluded from the set of regressors. This should not be surprising since values of FRA for different legislatures in the same country are heavily correlated and at the same time the fractionalisation of the legislature affects the probability that anticipated elections are called. However, given that the statistical performance of FRA is much weaker than the one of VIV, I use only the latter in the basic specification.

3.4.3 *The role of economic variables.*

Estimates of models which include the economic variables discussed in Subsection 3.2.2.a are reported in Table A3.3 of Appendix A3.1. To maintain a parsimonious specification, I exclude from the r.h.s. the variables that do not play any relevant role in the models of Table A3.2. Moreover, I include the duration of the formation process among the set of covariates. This implies that determinants of formation duration must be dropped as well. To partially compensate for the exclusion of CI and ENP (that contributes to determine FORM), I use the dummy SING, which takes value 1 if the cabinet is supported by a single party. Thus, being less fragmented, single-party governments are expected to last longer and the estimated coefficient on the dummy should be positive. In addition to that, I keep the variable MED which, as previously discussed, somehow accounts for ideological connection, albeit in an admittedly unsophisticated way. However, as I point out below, results on the economic variables do not appear to be sensitive to choice of political variables.

Monthly economic time-series of the industrial production index and of the consumer price index are not available for all countries for the whole sample period. This implies a loss of observations (that decrease to 230) with the obvious implications that coefficients on all variables are less precisely estimated. In spite of this, as can be seen comparing the estimates in Table A3.2 with those in Table A3.3, the results concerning the political variables are qualitatively unaffected and remain broadly consistent with theoretical predictions.

In Column 1 the rate of Table A3.3 the rate of growth of industrial production, IPG, and the rate of change of inflation, CPGG, are included. Building on the argument that positive economic conditions enhance stability, the expectation is of a positive

coefficient on the former and a negative coefficient on the latter. Estimated coefficients conform to this hypothesis, but only the one on IPG is statistically different from zero. Henceforth, there is evidence that to increase its chances of survival, a government must promote production growth even at the price of increasing inflation. In this sense, a left-oriented government (which is typically assumed to care more about production and less about inflation) would benefit from an advantage, in addition to the higher labour quiescence, relative to a right-oriented one.

In Column 2 the levels of inflation and industrial production are entered together with the rates of change. Coefficients are of the expected sign, with the exception of CPGG which turns positive, but still largely insignificant. The models in Column 3 and in Column 4 take into account the impact of the volatility of inflation. Similarly to CPGG, CPGVOL never displays an estimated coefficient statistically different from zero, so that production growth appears to be the main channel through which economics affect cabinet duration. Interestingly, this piece of evidence is consistent with the finding in Chapter 2 that production growth inversely correlates with the duration of the formation process, whilst inflation do not seem to alter the length of negotiations. These two results combined suggest that production more than inflation determines key aspects of the political cycle [12]

All the models with the economic variables have been re-estimated dropping FORM and including its determinants FIRST, CARE and CI (or ENP) without any significant change in the results on the economic variables being observed. Similarly, the inclusion of political variables that are not significant in the basic specification of Table A2.3 has almost no impact.

3.4.4. Estimated baseline hazard function

With the flexible parametric approach described in Section 3.3, estimates of the logs of the integrated hazard function, δ_t in model (3.10), are obtained from the log-likelihood (3.14). Two sets of estimated values for δ_t are reported in Table A3.4. The first set refers to the model in Column 2 of Table A3.2 (the purely political

[12] The lack of importance of inflation as a determinant of cabinet duration persists when inflation differentials are used instead of the level, change or volatility of inflation rates. In fact, it might be argued that the electorate is willing to accept inflation if inflation is endemic across countries. Then,inflation differentials would matter. To test this hypothesis, for each government in each country, I constructed measures of the inflation differential with respect to (i) any of the other countries in the sample, (ii) the full sample average, (iii) the G7 average. Estimated coefficients on all these differentials turn out to be not statistically different from zero.

specification), the second set to the model in Column 1 of Table A2.3 (the politico-economic basic specification). Estimated values are then plotted against time in Figure A3.1.

In order to gain insights about the underlying distribution of duration data, in Figure A3.2 plots of the integrated hazard obtained from some well-known parametric distributions are superimposed on the plots of the estimated δ_t. The three parametric distributions considered are the *Weibull*, the *Gompertz* and the *Exponential*. The hazard function for each of these three is defined as follows:

(8a) $\lambda(t) = \gamma\alpha t^{\alpha-1}$ with $\gamma > 0$ and $\alpha > 0$ for the Weibull

(8b) $\lambda(t) = \alpha \exp(\gamma t)$ with $\gamma > 0$ and $\alpha > 0$ for the Gompertz

(8c) $\lambda(t) = \gamma$ with $\gamma > 0$ for the Exponential.

The graphical evidence from Figure A3.2 suggests that the Gompertz and, to a smaller extent, the Weibull are clearly more appropriate than the exponential to represent the underlying distribution of cabinet duration data. This result is important given that the exponential distribution has been often assumed in previous studies (i.e. King et al. 1990). The plots also show that the stochastic process used to represent the history of a cabinet appears to be characterised by positive duration dependence (a convex integrated hazard). That is, survival decreases with tenure in office. This result is consistent with a decreasing opportunity cost of anticipated dissolution of the legislature as the constitutionally established parliamentary term approaches.

3.5 Directions for future research and conclusions.

In this Chapter, I have tested a set of theoretical predictions concerning the determinants of government duration in western European coalition systems. The theoretical framework is a version of Lupia and McCubbins (1998) and yields predictions concerning the impact of various political and economic factors on the probability that a government will be terminated as a consequence of the occurrence of stochastic events. The empirical analysis is based on a Proportional Hazards Specification estimated by a flexible parametric approach originally proposed by Han and Hausman (1990). Key findings can be summarised as follows.

Majority status, ideological homogeneity of coalition partners, ideological vicinity of the coalition to the median party, low numerical fragmentation of the coalition, overall stability of the legislature, low polarisation of the political system (defined as the electoral importance of the extremist parties) and a longer time horizon to next scheduled elections all significantly increase cabinet duration. There is also some quite robust evidence that the ideological orientation (or the policy preferences) of the coalition do affect the survival rate: right-oriented coalitions appear to generate less stable cabinets. Economic conditions also matter for duration. More specifically, it is production growth more than inflation that alters the probability of a government collapsing. Finally, the estimates of the integrated baseline hazard function suggest that the underlying distribution of cabinet duration data is likely to be a Gompertz (or possibly a Weibull) distribution, and that the stochastic process used to represent the history of a cabinet is characterised by positive duration dependence.

An interesting avenue of future research concerns the mechanisms through which the ideological orientation of the incumbent affects duration in office. I can identify two not mutually exclusive possible channels for this effect. One is that left-oriented governments face less fierce opposition from unions and this translates into more relaxed labour relations. This has two beneficial implications for the government. First, labour disputes are reduced and the popularity of the incumbent increases among voters. Second, the inflation/unemployment trade off is characterised by more favourable terms and this in turn allows the cabinet to deliver high production at low inflation. Again, this combination is most likely to impress voters positively. The other possible explanation is that left-wing governments typically care more about production and less about inflation. Since production is what matters for cabinet stability (as the results reported in Table A3.3 show), a left-wing government has an intrinsic advantage over a right-wing one.

These considerations suggest two ways in which the empirical work should be extended. First, it would be important to see whether the correlation between labour disputes and duration in office is effectively negative. Merlo (1998) provides evidence that is indeed the case in Italy. Second, it should be verified whether or not ideological differences significantly explain differences in economic outcomes in general, and in the rate of production growth in particular. In fact, the greater concern of left-oriented governments towards production might be at least partially compensated by their tendency to sustain higher level of redistributive taxation. This would in turn reduce the rate of output growth in an AK framework, but it would also grant support for the

incumbent from the targeted socio-economic groups. In the end, the final impact on stability is not clear ex-ante. The specification of the empirical model could then be extended in the sense of including economic variables in addition to those considered in Table A3.3. The problem with such an extension is that data on other economic aggregates are not usually available on a monthly basis for a sufficiently long period of time.

Future research should also consider the possibility that political and economic outcomes are jointly endogenous; that is, that bad economic conditions are at the same time a consequence and a source of political instability. Within the statistical framework of this Chapter, joint endogeneity should be tackled using systems of simultaneous equations as those described by Maddala (1983).

Appendix A3.1 Tables and Figures

Table A3.1. *Cabinet duration in western European coalition systems: summary statistics*

	MEAN	MIN	MAX	STDEV	SURV	FIRST	SECOND	THIRD	FOURTH	MEDIAN
AUT	890.74	159	1475	495.92	0.6101	431.2	596.6	1166	1432.6	1117
BEL	577.38	48	1555	490.15	0.3955	165.6	263	512.8	1024.2	371
DEN	622.63	42	1348	324.04	0.4265	372.2	492.6	737.8	837	609
FIN	399.58	36	1454	363.77	0.2737	127.4	206	304.8	659.4	263.5
FRA	388.7	10	1193	336.74	0.213	146.2	224.2	347.2	623.8	305
GER	688.81	17	1485	500.82	0.4718	212	501	741	1303	616
ICE	915.39	116	1504	480.33	0.627	383.6	821.4	1176	1394.8	1086
IRE	882.33	252	1574	395.02	0.4835	575.4	837.8	948.2	1194.8	872
ITA	343.74	23	1094	222.5	0.1884	167	236	371	505	259
LUX	1292	182	1970	636.48	0.7079	814.8	1049.2	1819	1846.4	1369
NETH	885.05	132	1749	582.1	0.6062	264.2	587.8	1160	1512	800
NOR	745.57	28	1435	388.05	0.5107	416.2	607.6	776.4	1082.6	715
SWE	752.39	148	1466	412.69	0.6024	370.8	527.8	871	1095.8	588
TOTAL	630.91	10	1970	473.39	0.4119	197.2	370	646.6	1095	500

MEAN is the mean of the distribution of duration data (in days); MIN and MAX are the two bounds of that distribution; STDEV is the standard deviation; SURV is the average survival rate (defined as effective duration divided by the maximum time allowed by the Constitution between two consecutive non-anticipated elections); FIRST, SECOND, THIRD and FOURTH are the first, the second, the third and the fourth quintile of the distribution respectively; MEDIAN is the median of the distribution.
Source: own computation from raw data in Woldendorp et al. (1993 and 1998).

Table A3.2. *Basic and extended political models of cabinet duration.*

	1	2	3	4	5	6	7
Constant	0.91487	1.1926	1.0972	1.3126	1.0451	1.1899	1.3705
	(1.1786)	(0.89955)	(1.2381)	(0.96517)	(0.25115)	(0.90042)	(0.39448)
MAJ	0.64271	0.74863	0.92855	0.78734	0.63568	0.77008	0.91469
	(0.30292)	(0.29931)	(0.29506)	(0.29922)	(0.29736)	(0.29992)	(0.24370)
ENP		-0.41558	-0.37716	-0.27690	-0.37368	-0.43975	
		(0.14700)	(0.14925)	(0.15175)	(0.14798)	(0.14189)	
MED	0.13232	0.089903	0.054948	0.07683	0.01241	0.11871	-0.12512
	(0.35140)	(0.35165)	(0.36261)	(0.35127)	(0.35095)	(0.35371)	(0.30443)
MEDPM	0.35209	0.35781	0.44251	0.36528	0.39698	0.41694	0.15521
	(0.26677)	(0.26216)	(0.26196)	(0.26113)	(0.27590)	(0.26430)	(0.23964)
POL1	-0.04341	-0.03613	-0.29309	-0.03564	-0.03545	-0.037572	
	(0.01095)	(0.01156)	(0.011562)	(0.011415)	(0.011783)	(0.011599)	
POL2	-0.03874	-0.01817	-0.02404	0.06994	0.18312	-0.00038	
	(0.078658)	(0.07689)	(0.07701)	(0.076683)	(0.07977)	(0.07741)	
LEG	-0.09989	-0.11553	-0.08720	-0.13059	-0.05409	-0.10450	0.41425
	(0.60156)	(0.55301)	(0.57526)	(0.54471)	(0.53951)	(0.55545)	(0.44755)
GOV	-0.23274	-0.16040	0.067339	-0.13286	-0.09440	-0.20322	-0.67251
	(0.45093)	(0.44994)	(0.44368)	(0.45413)	(0.46079)	(0.44958)	(0.42058)
RES	0.36940	0.46356	0.56304	0.51460	0.43486	0.44526	1.0061
	(0.55622)	(0.54409)	(0.55615)	(0.54169)	(0.55799)	(0.54811)	(0.50393)
VIV	1.6236	1.8239	1.7265	1.9832	1.4856	1.8236	
	(0.5999)	(0.57687)	(0.58798)	(0.59493)	(0.58273)	(0.58306)	
FIRST	1.5995	1.4728	1.6558	1.4185	1.2302	1.4599	
	(0.24994)	(0.24432)	(0.25074)	(0.24213)	(0.25932)	(0.24689)	
CARE	-1.2633	-1.0998	-1.1190	-1.1278	-0.99252	-1.1543	
	(0.51583)	(0.49176)	(0.48450)	(0.48575)	(0.49495)	(0.49417)	
OPP	0.13378	0.34713	0.29470	0.39247	0.35964	0.36252	
	(0.70168)	(0.69600)	(0.71819)	(0.69882)	(0.70418)	(0.70836)	
CI	-0.36942						
	(0.16048)						
SIZE	0.24902						
	(0.71993)						
DURLAG			-0.10101				
			(0.12087)				
COAL			0.006012				
			(0.035109)				
PM			-0.02068				
			(0.031322)				
LOC				-0.17816			
				(0.098779)			
GAP(2)					-0.21108		
					(0.067936)		
EVEN (5)						-0.005790	
						(0.017193)	
FORM							0.27388
							(0.072109)
LOG-LIK	-696.8221	-702.7603	-700.1859	-699.4793	-710.6615	-694.5675	-741.7284
Chi-squared	486.73	492.06	490.8813	498.6250	476.2606	482.9292	307.7625
(p-value)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

Estimates are obtained from the Logistic Probability Specification discussed in Section 1 of the paper. Total number of observations is 345 (326 for the model in Column 7). Standard Error in brackets. A positive coefficient on a variable means that larger values of that variable lower the hazard and hence increase duration. The chi-squared statistic is a valid test statistic of the null hypothesis that all slopes on the covariates are 0. Large values of the test-statistic (low p-values) are an indicator of good model adequacy.

Table A3.3. Political-economic models of cabinet duration.

	1	2	3	4
Constant	1.3754	0.22524	1.2392	1.2475
	(1.0030)	(2.1073)	(0.99768)	(1.0073)
MAJ	0.55060	0.29934	0.53365	0.53211
	(0.41810)	(0.22649)	(0.31122)	(0.36476)
SING	0.49388	0.23454	0.46974	0.46602
	(0.48367)	(0.48495)	(0.48150)	(0.49527)
MED	0.021641	-0.045385	0.037414	0.03933
	(0.39350)	(0.39478)	(0.39498)	(0.39992)
FORM	0.29062	0.27803	0.25596	0.25549
	(0.11010)	(0.11330)	(0.10663)	(0.11262)
POL1	-0.060712	-0.060682	-0.058736	-0.058764
	(0.012998)	(0.013913)	(0.012792)	(0.013180)
POL2	0.16029	0.10703	0.15698	0.15651
	(0.79149)	(0.086946)	(0.07899)	(0.079170)
VIV	1.0060	0.53537	0.98403	0.97970
	(0.55774)	(0.36159)	(0.76436)	(0.86740)
IPG	0.76335	0.73194	0.76272	0.76373
	(0.22029)	(0.22135)	(0.23376)	(0.23338)
CPGG	-0.040307	0.037359		-0.13521
	(1.7736)	(1.8280)		(1.0916)
IP		0.00538		
		(0.00477)		
CPG		-0.20187		
		(0.53830)		
CPGVOL			0.58835	0.59203
			(0.64876)	(0.65280)
LOG-LIK	-337.0449	-336.9362	-337.3678	-337.3006
Chi-squared	188.9446	189.1621	188.2988	188.4332
(p-values)	(0.0000)	(0.0000)	(0.0000)	(0.0000)

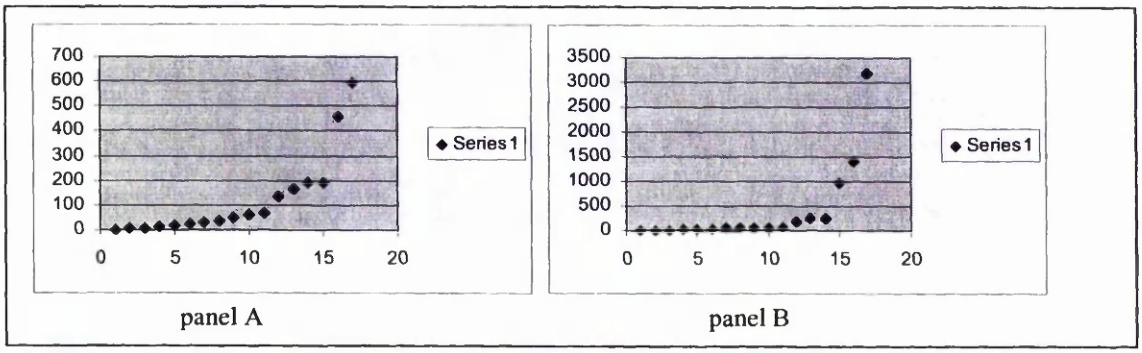
Estimates are obtained from the Logistic Probability Specification discussed in Section 1 of the paper. Total number of observations is 230. Standard Error in brackets. A positive coefficient on a variable means that larger values of that variable lower the hazard and hence increase duration. The chi-squared statistic is a valid test statistic of the null hypothesis that all slopes on the covariates are 0. Large values of the test-statistic (low p-values) are an indicator of good model adequacy.

Table A3.4. *Estimates of the logs of the integrated baseline hazard function.*

Basic Model		Politco-economic model	
Estimated values of Delta	Std. Error	Estimated values of Delta	Std. Error
0.87664	0.13207	0.97364	0.23329
1.6768	0.14721	2.0359	0.2696
2.0232	0.14519	2.4854	0.24969
2.5531	0.14873	3.0517	0.23727
2.8757	0.15082	3.3213	0.22793
3.1509	0.14908	3.6211	0.22023
3.3426	0.14082	3.8592	0.22103
3.5582	0.15123	3.9569	0.22543
3.8635	0.15522	4.0572	0.23499
4.0987	0.16643	4.1288	0.23667
4.1908	0.16901	4.3238	0.25848
4.9364	0.21021	5.2659	0.41943
5.1263	0.22392	5.4764	0.42989
5.2736	0.25953	5.4764	0.66833
5.2736	0.5991	6.8894	1.1353
6.1326	0.47345	7.2393	0.77495
6.3845	0.52137	8.0654	1.1491

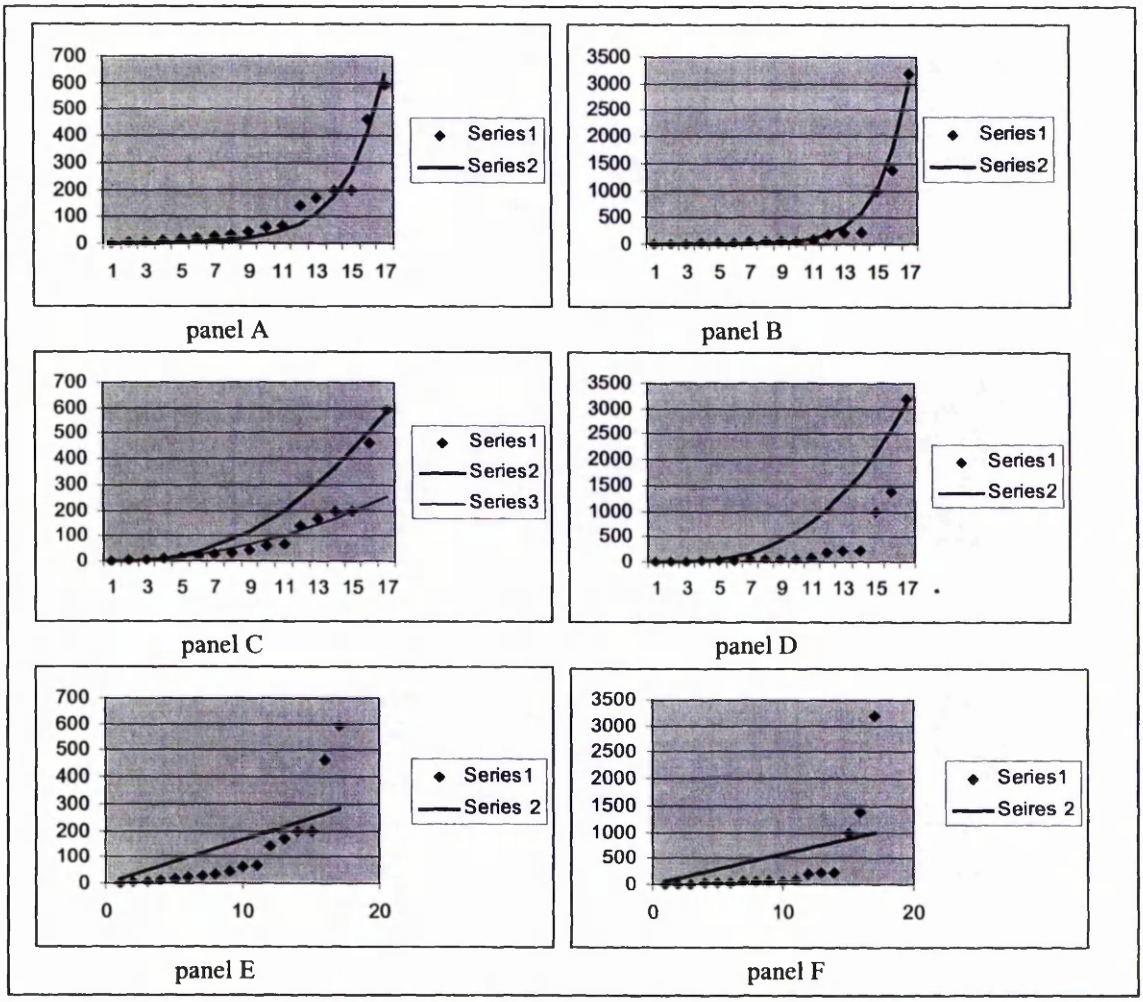
Delta is defined as in equation (3.10) of the paper. Estimates in the first column of this table refer to the model specification of Column 2 in Table A3.2. Estimates in the third column of this table refer to the model specification of Column 1 in Table A3.3.

Figure A3.1. *Plots of estimated integrated baseline hazard.*



Panel A is the plot obtained from the estimates reported in the first column of Table A3.4. Panel B is the plot obtained from the estimates reported in the third column of Table A3.4. Values of the integrated baseline hazard are on the vertical axis, time is measures on the horizontal axis.

Figure A3.2. *Integrated hazard functions generated by some parametric distributions.*



The integrated hazard generated by the Gompertz distribution is Series 2 in panel A ($\gamma = 0.43$, $\alpha = 0.28$) and Series 2 in panel B (($\gamma = 0.55$, $\alpha = 0.25$). The integrated hazard generated by the Weibull distribution is Series 2 (($\gamma = 1$, $\alpha = 2.3$) and Series 3 (($\gamma = 1.3$, $\alpha = 1.9$) in panel C and Series 2 in panel D (($\gamma = 1$, $\alpha = 2.9$). The integrated hazard generated by the Exponential distribution is Series 2 in panel E and F. In all panels, Series 1 is the estimated baseline hazard function. Values of the hazard are measured on the vertical axis, time on the horizontal axis.

Appendix A3.2 A simple game theoretic account of labour quiescence.

The empirical analysis of Chapter 3 yields the result that left-oriented governments last longer than right-oriented ones. A possible explanation for this finding is that left-oriented governments enjoy some considerable degree of labour quiescence. This in turns reduces the extent of labour disputes and allows the government to deliver better economic outcomes (i.e. higher production or employment and lower inflation).

The theory of labour quiescence is originally proposed by Cameron (1984). He argues that encompassing and centralised labour unions (such as those operating in Scandinavian Social Democracies) moderate their wage demands in response to expansionary fiscal policies undertaken by left-wing governments. This mix of expansionary fiscal policies and wage moderation generates high production and employment (eventually, full employment is achieved) together with low inflation. The two necessary conditions for this favourable situation to occur are (i) that unions must internalise the adverse consequences of wage aggressiveness on employment and inflation and (ii) that wage-bargaining must be centralised at national level so that negotiations at sector or firm level are in line with the nationally negotiated wage rates.

The bulk of the theory can be understood in simple game theoretic terms following the proposal of Scharpf (1997) and Boix (1998). Consider a simple two-player game. The first player is Government (G). G has to decide between an expansionary fiscal policy (to boost the economy and rise employment) and a tight fiscal policy (to run a balanced budget and prevent inflation from rising). The second player is the labour union (U). In the wage bargaining process, U can behave moderately or aggressively. Four possible outcomes are thus identified: (a) expansionary fiscal policy (*exp*) and wage-moderation (*mod*), (b) expansionary fiscal policy (*exp*) and wage-aggressiveness (*agg*), (c) restrictive fiscal policy (*res*) and wage-moderation (*mod*) and (d) restrictive fiscal policy (*res*) and wage-aggressiveness (*agg*).

Standard partisan preferences are assumed to characterise the government. More specifically, a left-wing G will care more about production and employment whilst a right-oriented G will care more about balanced budget and low inflation. Unions instead care about both employment level and wages. If the labour market is tight (as is the case when the government pursues expansionary policies), then U prefers a high wage increase to a low wage increase. But, if demand for labour is low (as it is the case when the government pursues restrictive fiscal policies), then U prefers a low wage increase

to a high wage increase in order to avoid exacerbating the already negative effects on employment of government policies. This set of preferences results from a formal set-up discussed in Scharpf (1997) and is consistent with most of the literature in this area (see Boix, 1998). Later, I will also consider alternative type preferences for both the government and the union.

Payoffs are based on players' ranking of the four possible outcomes. Let 4 represent the most preferred outcome and 1 the least preferred outcome. Then payoffs are summarised in Table A3.5

Outcome	*Left-wing G*	*Right-wing G*	*Union*
exp-mod (a)	4	2	3
exp-agg (b)	3	1	4
rest-mod (c)	2	4	2
rest-agg (d)	1	3	1

Table A3.5. *Payoffs for the Government-Union game*

According to the original argument advanced by Cameron (1984), an encompassing union would internalise the costs of aggressive behaviour and the long-term benefits of moderation. This is equivalent to say that for such a union the payoff of the outcome (*exp-mod*) is increased by one and then assume (as a tie-breaking rule) that the union always prefers (*exp-mod*) to any other outcome offering the same payoff. Let this be called the "encompassing union hypothesis".

I now turn to the analysis of game equilibria. Consider first the interaction between a right-wing G and the union. Assume that moves are simultaneous. The payoffs matrix is displayed in Figure A3.3.

		U	
		Wage-moderation (mod)	Wage-aggressiveness (agg)
G	Expansionary policy (exp)	2, 3	1, 4
	Restrictive policy (res)	4, 2	3, 1

Figure A3.3 *Payoffs matrix for the Government-Union game when government is right-wing.*

Notice that *res* is dominant for G. The equilibrium is thus defined by the pair (*res*, *mod*). Given the partisan preferences of G, the outcome (*exp*, *mod*), which implies

"ideal" economic conditions (high production and employment and low inflation), cannot be achieved, not even under the "encompassing union hypothesis". The characterisation of the equilibrium outcome is unchanged when a game of sequential moves is assumed. Independent from who moves first, the Subgame Perfect Equilibrium remains (*res*, *mod*): the economy is thus characterised by relatively low inflation and employment below the full occupation level.

Consider now the case of left-wing government (Figure A3.4). Expansionary is now the dominant strategy for G. The equilibrium of the simultaneous moves game is represented by the combination (*exp, agg*). However, under the encompassing union hypothesis, the outcome (*exp*, *mod*) is achieved. The same result holds for a game of sequential moves.

		U	
		Wage-moderation (mod)	Wage-aggressiveness (agg)
G	Expansionary policy (exp)	4, 3	3, 4
	Restrictive policy (res)	2, 2	1, 1

Figure A3.4. *Payoffs Matrix for the Government-Union game when the government is left-wing.*

Thus, a left-wing government facing an encompassing and centralised union can obtain high employment and low inflation at the same time. This favourable combination will increase the popularity of the incumbent among voters, thus enhancing its chances of survival in office as critical events occur.

I now extend the analysis to consider alternative payoffs structures. Figure A3.5 represents the case of a game between the union and a "centrist" government. This government is centrist in the sense that it cares about low inflation, but also prefers expansionary policies to tight ones. One may think of this government as the result of a left-right coalition, where each of the two sides must give up some of its original ideology or, alternatively, as a left-wing government that tries to attract support from middle-class sectors (typically more worried about inflation). The payoffs of such a government are quite similar (though not identical) to those which characterised some left-wing cabinets in Europe after the oil shocks and the negative experiences of British and French left-oriented governments (see Boix, 1998).

Notice that expansionary dominates for G, but also that G is always better off if U is moderate. The equilibrium is represented by (*exp, agg*), but, as before, under the encompassing union hypothesis, (*exp*, *mod*) can be achieved. In terms of equilibrium

characterisation (with and without the encompassing union hypothesis) the game with simultaneous moves is therefore identical to the one between the union and a left-oriented cabinet. An innovative result instead appears from the game with sequential moves. If the union is encompassing and wage-bargaining centralised, then high employment and low inflation are again achieved. However, if the encompassing union hypothesis does not hold, then the equilibrium outcome changes, depending on who moves first: if G moves first, then (*res, mod*) is obtained; if U moves first, then (*agg, exp*) is obtained. In other words, two almost opposite scenarios are possible if the moves are not simultaneous and unions are not encompassing.[13]

		U	
		Wage-moderation (mod)	Wage-aggressiveness (agg)
G	Expansionary policy (exp)	4, 3	2, 4
	Restrictive policy (res)	3, 2	1, 1

Figure A3.5 *Payoffs matrix for the Government-Union game when the government is "centrist".*

In Figure A3.6 I modify the payoffs structure of player U to represent the case of a union whose primary concern is to obtain high wage increases. This could be the case of a union dominated by the interests of the insiders or of an "always fight" ideological union. Government can be either left-wing or right-wing (its payoffs in this latter case are shown in brackets).

		U	
		Wage-moderation (mod)	Wage-aggressievness (agg)
G	Expansionary policy (exp)	4 (2), 2	3 (1), 4
	Restrictive policy (res)	2 (4), 1	1 (3), 3

Figure A3.6. *Payoffs matrix for the Government-Union game when union's primary concern are high wage increases.* Payoffs of left-wing G are outside brackets, on the left. Payoffs of right-wing G are inside brackets.

For a left-oriented government, *exp* is dominant, whilst *agg* is dominant for U. The equilibrium is thus (*exp, agg*). But contrary to the case in Figure A2.5 (a left-wing

[13] In Boix (1998), (*res, agg*) is preferred by G to (*exp, agg*). Then, it turns out that no stable equilibrium can be identified in the simultaneous moves game and cycle of polices are observed.

government and a "normal" union), the encompassing union hypothesis here does not lead to an (*exp, mod*) equilibrium. One should assume that the payoffs of the union associated with (*exp, mod*) rises by two (rather than one) in order to obtain the high production, low inflation outcome. In other words, one should ask the union to give up its primary concern. Whether this is feasible or not depends upon the mechanism through which the preferences of the union are formed. Assuming a sequential moves game would not alter the result.

If the government is right-oriented, then the dominant strategies equilibrium is (*res, agg*): the economy would be characterised by low production and employment and high inflation, with clearly adverse consequences on the stability of the incumbent. Again, the encompassing union hypothesis would be ineffective and the assumption of sequential moves would leave the equilibrium features unchanged.

Clearly, there are limitations to the analysis proposed. The payoffs structure is very simplified. In particular, governments have almost purely partisan preferences. For instance, a right-oriented government prefers tight policies to expansionary ones even if it is clear that in this way low employment outcomes will be generated, with a reduction in the stability of the cabinet. One could imagine more sophisticated structures where the preferences over the possible outcomes reflect partisan preferences as well as survival concerns. Moreover, the game is a one-shot interaction, whilst in the real world the government-union game is repeated continuously.[14]

Nevertheless, I believe that the simple game-theoretic representation proposed in this Appendix provides a sufficiently clear rationale for the empirical result that left-wing governments survive longer. Under the encompassing union hypothesis, left-wing government extracts benefits from the quiescence of labour. Unions moderate their wage demands in response to expansionary fiscal policies and employment and production increase whilst inflation remains low. This favourable mix of economic conditions in turn increases the popularity of the incumbent and reduces its probability of collapse. The advantage for the leftwing government is particularly strong if, as it appears from the empirical analysis, high inflation does not significantly affects the survival of the incumbent.

[14] A further extension of the model could define a payoff structure which is such that unions display an aggressive-bias when facing a right-oriented government. However, it is obvious that this extension would only reinforce the results of this Appendix, namely that high employment/low inflation equilibria are more easily achieved by left oriented cabinets.

Appendix A3.3 Variables description

Let n be the number of parties in a coalition, m the number of parties in the legislature, s_i the share of coalition seats controlled by party i, l_i the share of seats held by party i as a proportion of total seats in the parliament, q_i the absolute number of parliamentary seats held by party i, θ_i party i's ideological location on a ten points Left-Right continuum, r the total number of key portfolios to be allocated (taken from Laver and Hunt, 1992). Then, the following variables are defined:

DUR *Duration in office of the cabinet.* Time (expressed in days) between the formation of the cabinet and the formation of its successors (Woldendorp et al., 1998).

ENP *Effective number of parties in the coalition* (Laasko and Taagepeera, 1979). For computational details see Appendix A2.4.

CI *Conflict of interest.* Dispersion of the policy positions of the n coalition partners. For computational details see Appendix A2.4.

MED *Median party included.* Dummy variable taking value 1 if the median party is a memer of the ruling coalition. The median party is identified as that party whose share of seats added to the share of seats of parties on its ideological left (or right) makes the cumulative sum of share larger than the threshold majority 0.5 So, let A, B, C and D be the four parties in a given legislature. Suppose that from Left to Right they are ordered as follows: A-B-C-D. Shares of parliamentary seats are: $l_A = 0.2$, $l_B = 0.15$, $l_C = 0.4$, $l_D = 0.25$. Then the median party is party *C*.

MEDPM *Median party holding prime minister office.* Dummy variable taking value 1 if the median party is included in the coalition and controls the office of prime minister.

CARE *Caretaker status.* Dummy variable coded as 1 if the incumbent government is a caretaker. The classification in Woldendorp et al. (1998) is used to identify caretaker governments.

FIRST *First formed cabinet after elections.* Dummy variable taking value 1 if the cabinet is the first formed of the new legislature.

TH *Time horizon to next scheduled elections.* Number of days separating the formation of the cabinet from the parliamentary term. It is expressed as a proportion of total maximum time between two consecutive elections.

POL *Polarisation of the party system.* Three definitions are used. POL1 measures the electoral support of extremist parties, POL2 the variance of the policy positions of parties in the legislature and POL3 the average

Euclidean distance between any two parties in the legislature. For computational details see Appendix A2.4.

OPP *Ideological concentration of the opposition* (Strom, 1984). Number of seats held by parties on the numerically largest ideological side of opposition as a proportion of the total number of opposition seats. Let A, B, C, D and E be the five parties in a given legislature. Suppose that from Left to Right they are ordered as follows: A-B-C-D-E. Parliamentary seats are: $q_A = 20$, $q_B = 15$, $q_C = 40$, $q_D = 15$, $q_E = 10$. If the government is formed by a coalition CD, then total opposition seats are 45. This opposition is fragmented in two sides: on the left of the government are A and B (for a total of 35 seats), on the right of the government is E (10 seats). The numerically largest ideological side is thus represented by A and B and the degree of concentration of opposition is 35/45 = 0.77.

SIZE *Size of the ruling coalition.* Share of coalition seats as a proportion of total parliamentary seats.

MAJ *Majority status.* Dummy variable taking value 1 if the ruling coalition controls at least 50% + 1 of total parliamentary seats.

SIZE *Relative size of parties in the coalition.* Size is equal to ENP divided by the absolute number of parties in the coalition *n*.

LEG *Legislature power to dissolve legislature.* Dummy variable taking value 1 if the legislature can dissolve itself. Coding is based on the data reported by Laver and Schofield (1990).

GOV *Government power to dissolve legislature.* Dummy variable taking value 1 if the government can dissolve the legislature. Coding is based on the data reported by Laver and Schofield (1990).

RES *Resignation after a no-confidence vote.* Dummy variable taking value 1 if the prime minister must resign after that a no-confidence motion has been voted by the parliament. Coding is based on the data reported by Laver and Schofield (1990).

VIV *Survival of the legislature.* Average survival rate of past legislatures. The survival rate is defined as the total period of office of a legislature divided by the maximum time established by the constitution between two consecutive elections.

ANT *Frequency of non-anticipated elections.* Number of non-anticipated elections divided by number of total elections held in a country. An election is considered as anticipated if held any time before the six months preceding the constitutional established term.

COAL *Expertise of the coalition.* Cumulative duration of all cabinets supported by the same coalition of parties that support the incumbent.

PM *Prime minister expertise.* Cumulative duration of all cabinets headed by the same prime minister heading the incumbent.

EVEN *Degree of balance of the government agreement.* Measure of the discrepancy between balanced allocation of portfolios (or balanced location on the policy scale) and actual allocation of portfolios (or actual location on the policy scale). For computational details see equations (2.24.b) and (2.25.a), Subsection 2.4.3 of Chapter 2 (EVEN2 and EVEN3) and equation (3.15), Subsection 3.4.2 of Chapter 3 (EVEN5).

LOC *Ideological location of the government/coalition.* It is measured as the weighted average of the locations of parties in the coalition. Two different systems of weights are used to define the LOC variables used in this chapter.

1. $\text{LOC3} = \sum_{i=1}^{n}(s_i\theta_i)$
2. $\text{LOC5} = \sum_{i=1}^{n}(f_i\theta_i)$

Other definitions, based on different assumptions concerning the structure of the decision making process, are discussed in Chapter 4.

GAP *Euclidean gap between the location of the median party and the location of the government/coalition.* Let θ_{mparty} be the ideological location of the median party. Then:

1. $\text{GAP1} = |\text{LOC3} - \theta_{\text{mparty}}|$
2. $\text{GAP2} = |\text{LOC5} - \theta_{\text{mparty}}|$

where absolute values denote Euclidean distances on the ten points ideological scale.

FRA *Effective number of parties in the legislature* (Laasko and Taagepeera, 1979). For computational details see Appendix A2.4

IPG *Industrial production growth.* Average monthly growth rate of the industrial production index (averages are taken over the life of the cabinet).

CPG *Consumer price growth.* Average monthly growth rate of the consumer price index (averages are taken over the life the cabinet).

CPGG *Change in CPG.* Average growth rate of CPG.

CPGVOL *Volatility of inflation.* Standard deviation of CPG.

4. AN ECONOMETRIC ANALYSIS OF THE POLITICAL ECONOMY OF FISCAL POLICY FORMATION.

> *"Let me warn you in the most solemn way against the adverse effects of the* spirit of party*"*. (President George Washington, reported in *Corriere della Sera*, 8 November 2000).

Over the last two decades, economists have been concerned with finding an explanation for a puzzling piece of evidence: the patterns of debt accumulation and persistence of large budget deficits display sharp cross-country differences. The basic theory of optimal budget policy suggested by Barro (1979) and Lucas and Stokey (1983) predicts that to minimise the distortionary impact of taxation on the utility function of individuals, tax rates should be kept constant over the business cycle. This *tax smoothing approach* leads to the appearance of deficits during recessions (or in war times), when spending is particularly high. However, as the cycle enters an expansion (or in peace times), spending decreases and surpluses are realised. Thus, deficits and surpluses are used as a buffer and the latter will compensate the former in present value terms. The consequence is a cyclical pattern of budget, without persistence of deficits and accumulation of debt, which is clearly at odds with the experience of several European countries since the early '70s.

As a matter of fact, the tax smoothing theory builds on the crucial assumption that the policymaker is a benevolent social planner with the same time horizon (infinite) of the representative consumer whose utility function is to be maximised. But these conditions are hardly verified in the real world. First of all, government turnover is a fundamental aspect of modern democratic countries, so that policymakers effectively have only finite terms of office. Moreover, once in office, governments do not necessarily behave as benevolent social planners. Individuals in a society are likely to be different in several respects. They form socio-economic groups with heterogeneous policy preferences and the incumbent could well favour some groups more than others on the grounds of ideological or electoral considerations. This suggests that positive theories should be constructed to take explicitly into account the impact of political and institutional factors on the process of fiscal policy formation. From such theories an explanation for observed patterns of deficit and debt in Europe could be obtained.

A vast body of theoretical literature on the political economy of budget deficits is now available (see Alesina and Perotti, 1995 and, more recently, Persson and Tabellini, 2000 for exhaustive surveys). However, some considerable degree of uncertainty still exists on the effective empirical relevance of many of these theories. In other words, when looking at the significance of political indicators in regressions of fiscal policy variables (such as the changes in the debt to GDP ratio or the government expenditure to GDP ratio), different authors reach different conclusions and econometric results often appear not to be robust to minor changes in the model specification and/or in the definition of the indicators. This Chapter is intended to be a contribution to the applied research on the political determinants of fiscal policy outputs. By making use of the data-set of indicators introduced in Chapter 1, I implement a test of several positive theories of fiscal deficits, government spending and taxation and obtain results that extend on those already obtained in the empirical literature.

The Chapter is structured as follows. In Section 4.1, the bulk of the theories is outlined and a brief survey of the existing evidence on their relevance is given.[1] In Section 4.2 the simple econometric framework is described. Section 4.3 explains how the political and institutional factors mentioned in the theories of Section 4.1 are incorporated in the econometric framework of Section 4.2. Estimates are then discussed in Section 4.4. Section 4.5 presents some results concerning the role of the median voter in fiscal policy formation. Finally, Section 4.6 concludes and sets the lines of future research. Appendix A4.1 contains some algebraic details of one of the models discussed in Section 4.1. Appendix A4.2 reports the tables with the full set of econometric results. Appendix A4.3 gives the definition and procedures for the computation of the political proxies. Many of these have already been introduced in the previous Chapters and additional details can be found in Appendix A2.4 of Chapter 2 and Appendix A3.3 of Chapter 3.

4.1 Political and institutional determinants of budget deficit, public spending and taxation.

Political economy models of fiscal policy describe how political and institutional factors determine deviations of deficit and spending (or eventually taxation) from a

[1] The presentation of formal models will be kept at an extremely basic level. Its objective is to illustrate the theoretical underpinning of the econometric analysis (the real focus of the Chapter). Extensions and complications of basic models are discussed intuitively and references are given that can be used by readers interested in a more sophisticated treatment.

benchmark case where the benevolent policymaker cannot be replaced in office and individuals are all alike (so that the representative agent hypothesis holds). In this Chapter, I look at (i) pre-electoral manipulation of fiscal policy and fiscal illusion, (ii) partisan preferences of policymakers, (iii) government instability and uncertainty about government duration, (iv) fractionalisation of the decision-making process and dispersion of political power, (v) the role of budgetary institutions and electoral rules.[2]

4.1.1 *Pre-electoral manipulation of fiscal policy and fiscal illusion.*

One possible reason why the pattern of budget deficit predicted by the tax smoothing approach is not consistent with those observed in the real world is that policymakers might manipulate fiscal policy when elections are approaching in an attempt to increase their chance of being re-elected. Aghion and Bolton (1990) propose a model where the electoral outcome depends on debt accumulation. It turns out that under some circumstances concerning the distribution of preferences within the electorate and the form of the government budget constraint, issuing more debt increases the share of votes the incumbent will receive at next elections. Thus, an incumbent with purely opportunistic incentives will promote larger deficits and accumulate debt in electoral and pre-electoral years. The formal characterisation of the model is as follows.

Consider a two-period economy where individuals belong to one of two groups, L and R. Generic individual i in generic group J (J = L, R) has utility defined over private consumption and consumption of a public good g_t^J (t = 1,2). There are two parties in the system: party l provides public good g^L when in office and party r provides public good g^R when in office. Individuals vote for the party that maximises their utility when in office. Government finances public spending through labour taxation and debt issue. Debt issued in the first period must be paid back in the second period. Labour is taxed only in the second period since in the first period consumers finance private consumption only through a fixed endowment (equal for everybody) that cannot be taxed. This implies that indirect utility from private consumption can be expressed as a function of the amount of debt issued in the first period b and a function $G(b)$ that

[2] Another important issue concerns intergenerational conflicts (e.g. Cukierman and Meltzer, 1989). However, empirical tests of such models are extremely hard to implement and I do not investigate them in this Chapter.

defines equilibrium spending on public good g^J in period 2 as a decreasing function of b. The utility of the generic individual is thus written as:[3]

$$(4.1) \quad w^{i,J} = v(G(b)+b) + H(g_1^J) + H(G(b)) + (\sigma^{iJ} + \delta)K^l$$

where $G(b) = g_2^J$ and it is identical for both parties, $v(\cdot)$ is the indirect utility function that defines the maximum utility from private consumption given the policy variables b and g, H is a concave function such that $\partial H/\partial g > 0$, σ^{iJ} is distributed around a mean value of zero according to a uniform distribution with density ϕ^J, δ is distributed around a mean value of zero according to a uniform distribution with density ψ and K^l is a dummy variable taking value 1 if party l is in office.

Equation (4.1) incorporates an important feature. In spite of the fact that individuals in group J only care about public good j, group affiliation alone does not determine how individuals vote. Consider, for instance, a member of group L. He will unambiguously prefer the economic policy of party l (provision of public good g^L) to the economic policy of party r (provision of public good g^R). However, for negative realisations of σ and δ, his total utility under l government might be smaller than his total utility under a r government. If this is really the case, then this member of group L will vote for party r rather than for party l. Parameter σ in equation (4.1) represents an idiosyncratic bias of individual i in group J for party l. Parameter δ, instead, measures the relative popularity of party l among group J members. Negative values of these two parameters are observed when members of group J dislike the position taken by party l on dimensions of the policy space other than the economic one and/or when, independently from economic platforms, party r is relatively more popular than party l among members of group J.

Suppose that r is the incumbent in the first period and that elections have to be held at the end of the first period. The electoral rule is very simple: the party that gets the largest share of votes forms the government. This implies that a party wins the elections when receiving 50% +1 of total votes. Formally, a member of group L will vote for party r iff:

$$(4.2) \quad v(G(b)+b) + H(G(b)) + \sigma^{iL} + \delta < v(G(b)+b)$$

[3] For a formal derivation of equation (4.1) see Persson and Tabellini (2000, Chapter 13).

The r.h.s. of equation (4.2) is the utility of a L member when party r is in office; the l.h.s. is her utility when l is in office. Notice that condition (4.2) is met only if $H(G(b)) + \delta < -\sigma^{iL}$. That is, given the degree of popularity of party l relative to party r, a L member will vote for party r only if (heavily) biased against l. This requires that the individual dislikes the policy positions of party l on alternative dimensions of the policy space (i.e. foreign affairs, interior, justice, defence, etc..).

Similarly, a member of group R will vote for party r iff:

$$(4.3) \quad v(G(b)+b)+\sigma^{iR}+\delta < v(G(b)+b)+H(G(b))$$

Again, on the r.h.s. is the utility of R member when party r is in office; on the l.h.s. is his utility when party l is in office. Condition (4.3) is met if $H(G(b))-\delta > \sigma^{iR}$. Clearly, the fact that party r undertakes the economic policy favoured by individuals in group R implies that, for any given degree of relative popularity of the two parties, the generic R member will not vote for l unless holding a very strong idiosyncratic bias for it.

From equations (4.2) and (4.3) it is immediately clear that, for a realisation of $\delta = 0$ and under the assumption of a uniform distribution of idiosyncratic bias in both groups, party r will attract most of its votes (though not all of them) from group R. Moreover, it is possible to define the share of votes of r as function of b:

$$(4.4) \quad \pi_R(b) = \frac{1}{2} + H(G(b))\frac{\phi^R - \phi^L}{2} - \frac{\phi^R + \phi^L}{2}\delta$$

If the densities of the distributions of idiosyncratic bias are identical, then relative popularity is what determines the electoral outcome: for $\delta > 0$ (party l relatively more popular) the share of votes of party r drops below the majority threshold of 50%. Notice also, that for $\phi^L = \phi^R$ the level of debt issued in the first period does not affect the electoral outcome. However, results change substantially when the assumption that distributions have the same density is removed. The second term on the r.h.s. of equation (4.4) becomes negative for $\phi^R < \phi^L$; that is, when idiosyncratic bias is less homogeneously distributed in group R. This implies that r might not win elections even if relatively popular (negative values of δ). Nevertheless, party r in office in period 1 can increase its chances of winning by issuing more debt in the first period. In other

words, for $\phi^R < \phi^L$, given that $G(b)$ is decreasing in b and that H is a concave function, higher values of b *ceteris paribus* increase the share of votes of the incumbent party r. Formally, a larger b reduces the negative impact due to the higher density of group L. The intuition for this result is that by issuing more debt in the first period, party r implicitly reduces public spending in the second period. This means that some swing voters in group L will be attracted by party r and some swing voters in group R will be attracted by party l. But under the assumption that $\phi^R < \phi^L$, swing voters in group R are fewer, so that party r effectively increases its support by issuing more debt. On the contrary, if swing voters were fewer in group L (i.e., if $\phi^R > \phi^L$), then the incentive for the incumbent r would be to reduce debt issue, whilst l would increase it.

The above model suggests that fiscal policy is subject to electoral manipulation, although the direction of this manipulation (that is, whether it results in greater or smaller debt accumulation) depends on the relative homogeneity of the distribution of idiosyncratic bias in the group supporting the incumbent and hence on the number of swing voters in each group. However, under some circumstances, the prediction is that fiscal expansions will be undertaken by the government in electoral or pre-electoral years as an attempt to increase its chances of being re-elected.

An analogous prediction is obtained in a different theoretical framework by Buchanan and Wagner (1977). They argue that voters tend to overestimate the benefits of current spending and do not recognise the costs of future taxation. This in turn gives an opportunistic incumbent the chance to operate a sort of *fiscal illusion* by rising spending and deficit immediately before elections in order to maximise the probability of re-election. Notice that this argument is extremely close in spirit to the standard theory of political business cycle as proposed by Nordhaus (1975 and 1989).

In the empirical literature, the existence of pre-electoral manipulation is normally investigated by adding an electoral dummy (that is a dummy taking value 1 in electoral and/or pre-electoral years) on the r.h.s. of a regression model of some fiscal policy variable.[4] Corsetti and Roubini (1992) find that in industrial countries over the period 1960-1985, deficits tend to be significantly larger in pre-electoral years. However, Alesina et al. (1997), using a longer sample period, obtain that coefficients on electoral dummies are positive, but statistically insignificant. Evidence that pre-electoral manipulation of fiscal policy is not empirically relevant either is obtained by Peltzman (1992). Finally, these models do not predict persistence of deficits and high spending

[4] A more sophisticated test of Aghion and Bolton's model would require information on the distribution of bias in each socio-economic groups which is not normally available.

(the incentive to manipulate fiscal policy disappears after that elections are held) and hence cannot explain the continuous accumulation of debt observed in several European countries.

4.1.2. Partisan preferences of the policymaker.

As discussed in Section 2.2 of Chapter 2, political parties have preferred policies which they try to implement once in office. This implies that the contents of fiscal policy will be different depending on the ideological orientation of the ruling party/coalition. Several authors (e.g. Hibbs, 1977 and 1987; Alesina, 1987 and 1988; Alesina and Rosenthal, 1995) construct models in which parties choose different positions on the expectations-augmented Phillips curve. Competition for office and turnover of policymakers imply that a partisan business cycle of inflation and unemployment is generated, even under the hypothesis that expectations are formed rationally. Empirical tests of these models generally provide supportive evidence (see, Alesina et al. 1997).

With respect to fiscal policy, it is often maintained that in order to sustain aggregate demand and relatively high levels of welfare for low-income groups, left-oriented governments deliver higher levels of public spending and larger deficits than right-wing governments do (see, *inter alia*, De Haan and Sturm, 1994 and Borrelli and Royed, 1995).[5] These different preferences can be the source of partisan cycles of fiscal policy outputs as shown in the simple model below.

I consider a simplified version of the two-period framework proposed by Beetsma and Bovenberg (1997) and neglect supply shocks.[6] Party j ($j = r, l$) is in office at time t ($t = 1, 2$). Its loss function is written as:

$$(4.5) \quad W = \sum_{t=1}^{2} \beta^{t-1} L_t^G \quad \text{and} \quad L_t^G = \frac{1}{2}\left[y_t^2 + k_1^j (g_t - \mathbf{g}^j)^2 + k_2^j \pi_t^2\right]$$

[5] Notice how this assumption concerning the policy preferences of left-wing and right-wing governments is perfectly consistent with the set-up of Appendix A3.2 of Chapter 3.

[6] Tirelli (2000) significantly extends the basic framework of Beetsma and Bovemberg to an infinite horizon, with a government that also cares about deviations of public debt from a target level, and allows for supply side shocks.

where β is the discount factor, y is output level, g is public spending, $\mathbf{g}$ is the target level of public spending, π is the inflation rate, and k_1 and k_2 are positive weights.

To focus on fiscal policy issues, I assume that monetary policy is delegated to an independent central banker that controls inflation perfectly and always sets π_t at the socially optimal level implicit in equation (4.5) $\pi^* = 0$. This implies that the last term on the r.h.s. of the loss function can be dropped. Government finances spending by means of distortionary taxation τ_t and public debt. Taxes are distortionary in the sense that they linearly reduce total output. The initial stock of debt is inherited from time $t = 0$ and it is exogenously equal to D_0. Debt must be always paid back. The government budget constraint in the two periods is thus given by:

(4.6.a) $g_1 = -(1+\rho)D_0 + \tau_1 + D_1 \pm \mathbf{g}^j$ and (4.6.b) $g_2 = -D_1(1+\rho) + \tau_2 \pm \mathbf{g}^j$

where ρ is the real rate of interest. Following Jensen (1994), I assume that ρ is constant and government debt is fully indexed.

The first order conditions that determine taxes and spending are:

(4.7.a) $\tau_t = -k_1^j(g_t - \mathbf{g}^j)$

(4.7.b) $(g_t - \mathbf{g}^j) = \beta(1+\rho)(g_{t+1} - \mathbf{g}^j)$

Using (4.7.a), (4.7.b) and the budget constraints (4.6.a) and (4.6.b), the closed solutions for g in the two periods are determined as follows[7]:

(4.8.a) $$g_1 = \mathbf{g}^j\left[1 - \frac{\beta(1+\rho)}{1+\beta(1+\rho)^2}\frac{(2+\rho)}{1+k_1^j}\right] - D_0\left[\frac{\beta(1+\rho)}{1+\beta(1+\rho)^2}\frac{(1+\rho)^2}{1+k_1^j}\right]$$

(4.8.b) $$g_2 = \mathbf{g}^j\left(\frac{k_1}{1+k_1}\right) - \left(\frac{1+\rho}{1+k_1}\right)\left[(g_1 - \mathbf{g}^j)(1+k_1^j) + \mathbf{g}^j + (1+\rho)D_0\right]$$

Partisan preferences are represented by different values of $\mathbf{g}^j$ and k_1^j for the two parties r and l. More specifically, the left-wing party l assigns greater weight to the spending objective in the loss function and/or holds a higher spending target than the

[7] Algebraic details are given in Appendix A4.1.

right-wing government does. Formally $\mathbf{g}^l > \mathbf{g}^r$ and $k_1^l > k_1^r$. Then, comparative statics results on equations (4.8.a) and (4.8.b) can be used to characterise the partisan cycle of actual spending. First of all note that since debt must be always paid back (that is, $D_2 = 0$), this cycle is most clearly observed in the first period. Actual spending in the first period is strictly increasing in k_1^j for all parameter values and in $\mathbf{g}^j$ for a broad set (albeit not all) parameter values (see Appendix A4.1 for details on a sufficient condition for the derivative of g_1 w.r.t. $\mathbf{g}^j$ to be positive). Hence, higher actual spending is associated with left-wing governments. In the second period, spending is again increasing in $\mathbf{g}^j$, as long as $\beta(1+r) > 1$. This is in fact a necessary and sufficient condition for the stability of the model (see Tirelli, 2000). The sign of the correlation between second period actual spending and k_1^j is instead more ambiguous and depends on the amount of inherited debt D_0.

All in all, the model suggests that partisan preferences represented by different spending targets and/or different importance assigned in the utility function to hitting these targets affect actual spending in equilibrium. More specifically, for a broad set of parameter values, left-wing governments, characterised by a higher spending target and more concerned about spending objectives, effectively will tend to spend more. However, this does not necessarily imply that budget deficits are systematically larger when left-wing policymakers are in office. Intuitively, if it is true that left-wing parties are ideologically ready to spend more, it also true that they are most likely to tax more, so that they could effectively maintain a more balanced budget compared to right-wing governments (who spend less, but also tax less).

The prediction that left-wing governments will spend more than right-wing governments has received some support in the applied literature. Roubini and Sachs (1989a) use the average proportion of left-of-centre parties in the parliament as an index of the ideological orientation of the policymaker and obtain that it positively correlates with the long-run value of the ratio of government spending to output. De Haan and Sturm (1994) consider the impact of ideology on both deficit and spending. They obtain that their ideological variable is not significant in the regression of deficit, whilst it does play some role in a regression of the change in the government spending to GDP ratio. Interestingly, they also find that ideology is more significant in statistical terms when measured as the share of parliamentary seats held by left-wing parties rather than as the share of cabinet portfolios held by members of left-wing parties. Borrelli and Royed (1995) construct an index of ideology that takes values according to how portfolios are allocated between right-wing and left-wing parties. Contrary to what is obtained by De

Haan and Sturm, they find that this index is a significant determinant of the change in the deficit to GDP ratio. Differences in the size of the sample might help in explaining the conflict between the two results. Hahm et al. (1996) define an index of ideology based on the strength of the control exerted by centre-left parties on central government, but this turns out to have little explanatory power in the regression of deficit for nine industrialised parliamentary democracies over the period 1958-1990. Alesina et al. (1997) use a dummy variable for ideological location in a regression of the change in the public debt to GDP ratio and they conclude that its coefficient is not significantly different from zero. Pettersson (2000) obtains significant and sizeable partisan effects on spending and taxation in a sample of Swedish local governments. All in all, the result that ideology affects spending is rather well established; less clear is whether or not it also affects deficit. Furthermore, the issue of how to measure the location of the policymaker is still debated.

4.1.3 Government instability

Some of the countries that experienced the fastest growth in the debt to GDP ratio between 1965 and 1995 are also characterised by high government turnover (e.g. Belgium, Italy, Finland). Building on this simple observation, some authors propose a positive theory that links deficit and debt to government instability (Persson and Svensson, 1989; Alesina and Tabellini, 1990; Tabellini and Alesina, 1990). In these models, the incumbent faces a positive probability of being replaced in office by a successor with different preferences over the composition of public spending. The budget constraint is such that the larger the stock of debt issued by the incumbent, the smaller the amount of resources that the potential successor can use to finance spending. Thus, by issuing more debt now, the incumbent can tie the hands of its successor. The incentive to make this strategic use of debt is higher, the higher the degree of instability as measured by the probability that the incumbent government will collapse.[8]

Consider a two-party, two-period economy. The utility function of generic voter i is given by:

$$(4.9) \quad U^i = E\left\{\sum_{t=1}^{2}\left[\alpha^i u(g_t) + (1-\alpha^i)u(f_t)\right]\right\}$$

[8] In Persson and Svensson (1989) only a right-wing incumbent will use debt strategically. In Alesina and Tabellini (1990) and Tabellini and Alesina (1990) the incentive to use debt strategically exists independently from the ideology of the government. This latter is the prediction I will focus on.

where E is the expectation operator, f and g are two types of public good, α is a parameter such that $0 \leq \alpha \leq 1$ and $u'(\cdot) > 0$ and $u''(\cdot) < 0$. Notice that if $0 < \alpha < 1$, then voter i cares about both types of public goods; but unless $\alpha = ½$ he prefers one to the other.

The policy platforms of the two parties are assumed to be fully divergent in the sense that party G's utility function is defined as (4.9) with $\alpha = 1$, whilst party F's utility function is defined as (4.9) with $\alpha = 0$. It then follows that in each period only one of the two types of goods is provided: g if party G is in office, f if party F is in office. One unit of output is available in each period to finance public expenditure. Debt can be issued in the first period, but it must be paid back in the second period. To simplify the algebra and without affecting the basic results of the model, the real interest rate on government debt is assumed to be equal to zero. Then, the budget constraint in the two periods can be written as follows:

(4.10.a) $1 \geq h_1 - b$ and (4.10.b) $1 \geq h_2 + b \quad h = g, f.$

where b denotes debt.

Instability enters the model in the form of a probability p that the incumbent in period 1 will not be in office in period 2. For example, an election might be held at the end of period 1 and the electoral outcome be uncertain because of stochastic fluctuations of the preferences of the median voter. Alternatively, the cabinet might terminate before that the parliamentary term has expired as a consequence of the occurrence of critical events (see Chapter 3). Instability implies that generic voter i in period 1 does not know whether public good f or g will be supplied in period 2. This explains why the expectation operator has to be added to equation (4.9): it represents the expectation formed at period 1 about the identity of the incumbent in period 2.

To see how this instability affects fiscal policy decisions, let us assume that party G is the incumbent in period 1, so that $h_1 = g_1$. First consider the case where $p = 0$; that is, party G is certainly in office in period 2 and hence $h_2 = g_2$ with certainty. Then, party G sets optimal fiscal policy by solving the following problem:

(4.11) $\max_{g_1, g_2} u(g_1) + u(g_2)$ subject to the budget constraints (4.10.a) and (4.10.b).

It is immediately clear that given the concavity of the function $u(\cdot)$, party G will smooth spending over the two periods: $g_1^* = g_2^* = 1$ and $b^* = 0$. Notice that a benevolent social planner that weights all individuals equally would adopt the same smoothing behaviour and issue no debt. Of course, public spending would be allocated equally between the two types of public good.

Now consider the opposite case: $p = 1$ and hence $h_2 = f_2$. The incumbent G is certainly replaced in the second period and henceforth it solves the following maximisation problem:

(4.12) $\max_{g_1} u(g_1)$ subject to the budget constraint (4.10.a)

The solution is represented by $g_1 = 1 + b_{max}$, where b_{max} is the maximum amount of debt which can be issued in any given period.[9] In other words, maximum instability gives rise to maximum debt issue since the incumbent does not internalise the future costs of high spending. For $0 < p < 1$ debt is issued in the first period, but below the maximum level (see Tabellini and Alesina, 1990, for a full characterisation of the equilibrium outcome). The budget constraint (4.10.b) implies that party G can issue debt in the first period to reduce the resources available in period 2 to finance spending. Of course, if party G believes that it will be replaced by party F, then it has an incentive to minimise such resources available in period 2, and debt is issued in the first period. But if party G believes it will stay in power, then the concavity of an individual's utility function implies that the best pattern of spending is smoothed over the two periods.

Clearly, the mechanism operates to the extent that parties have different preferences over the provision of public goods (or, more generally, over fiscal policy). In fact, if the two parties share the same policy platforms, then smoothing of spending will arise even in the presence of instability. In other words, the incentive to use debt strategically to tie the hands of a possible successor exists if alternation in office involves significant changes in the ideological preferences of the policymaker. However, one could imagine a situation in which spending benefits ministers rather than parties. For instance, by allocating more spending to his own constituency, a minister will increase her chances of being re-elected and/or will receive side payments of various nature. If this is the case, then an incentive to overspend in the presence of cabinet instability would arise

[9] In the absence of additional constraint (such as those coming from participation into a monetary union), the assumption that debt must be always repaid and that it bears no interests implies that b_{max} is equal to the total output available in the two periods to finance spending: $b_{max} = 2$.

independently from the existence of partisan differences with potential successors. It follows that accumulation of debt would be observed even in countries where cabinet turnover is high, but partisan alternation in office is low.

The empirical relevance of the theory of strategic use of debt has been extensively investigated in the literature, but results appear to be rather conflicting. Grilli, Masciandaro and Tabellini (1991) obtain a negative correlation between size and persistence of the fiscal deficit on one hand and average cabinet duration on the other. Petterson (1999) tests the Persson and Svensson (1989) version of the model on a sample of Swedish local governments and he finds supportive evidence. De Haan, Sturm and Beekhuis (1999) measure instability by means of the rate of government turnover and obtain that net debt growth correlates positively with such a measure. Lambertini (1998) provides a test of both the Alesina and Tabellini and the Persson and Svensson version of the model for both OECD economies and the US. Results suggest that the hypothesis of strategic use of debt should be rejected. Volkerink (1999) concludes that the actual number of government transfers does not significantly affect gross debt accumulation in a sample of 19 OECD countries for the period 1965-1995.

4.1.4. Fractionalisation of the decision-making process and the role of electoral and budgetary institutions.

In most western European countries the coalitional and/or minority nature that often characterises governments implies that several political parties, possibly holding different policy views, jointly participate in the process of fiscal policy formation. A number of models posit that this fractionalisation and dispersion of political power is the cause of deficit persistence and debt accumulation. For instance, in Alesina and Drazen (1991) two parties that represent different socio-economic groups disagree on how the costs of a fiscal reform should be allocated. This generates government inaction and inefficient accumulation of debt until the conflict is resolved with one of the two parties accepting a reform that implies a larger share of costs for its constituency. This setting is extended by Drazen and Grilli (1993) to show how deep economic crisis might increase the speed of fiscal reforms and by Casella and Eichengreen (1994) to investigate the impact of foreign aid on the effectiveness of fiscal adjustments. Dalle Nogare (2000) provides a game theoretic account of how parties relatively close on some dimensions of the policy space might decide to join in a coalition in spite of holding different views on fiscal policy issues. The result is a strategic interaction

between partners in the government that leads to inefficient debt accumulation. The bottom line of this literature is that coalition governments are more likely to be fiscally irresponsible and they should be and are therefore associated with higher spending and deficit, especially if supported by parties of relatively heterogeneous ideologies.

A related avenue of research focuses on the problem of "fishing from a common pool" and investigates the role of electoral and budgetary procedures (see, inter alia, Hallerberg and von Hagen, 1997 and Velasco, 1998). Here the idea is that under centralised financing and decentralised spending, parties involved in the budget process internalise only a fraction of the cost of current spending. As in the standard "tragedy of the commons" (Turnell and Velasco, 1992), the non co-operative equilibrium is highly inefficient and involves over-issue of debt. The role of budgetary institutions is then to generate conditions that favour the co-operative behaviour of parties and prevent them from appropriating too large shares of the common pool of resources. Electoral institutions enter the model since they affect the fractionalisation of the executive and the type of budgetary institutions adopted in any given country at any given time. In what follows, I discuss a more formal version of this argument based on the two-period model of Persson and Tabellini (1998).

Suppose that two parties (L and R) are involved in the process of budget formation.[10] Each party maximises the utility function of the representative individual in its supporting constituency (constituencies and parties are of equal size):

$$(4.13) \quad U^i = u(g_1^i) + u(g_2^i) \qquad i = L, R.$$

where g_t is public spending (t = 1,2) , $g^L{}_t$ and $g^R{}_t$ are two types of public consumption and $u(\cdot)$ is a concave function.

Equation (4.13) incorporates the assumption that individuals in the supporting constituency of party R only care about g^R and individuals in the supporting constituency of party L only care about g^L. Thus, both parties and constituencies hold different preferences over fiscal policy outputs. Results would not be affected if it were assumed that individuals in group i also care about g^j ($j \neq i, j$ = L, R), as long as they assign a greater weight to g^i. In other words, the mechanism that generates the over-

[10] The most obvious situation is one where L and R share office in a coalition government. Alternatively, one might think of a case where party L (or R) alone forms the executive, with party R (or L) giving external support in exchange for the possibility of effectively contributing to budget formation.

issue of public debt is effective if the two constituencies (and hence the two parties) maintain policy views that are to some extent heterogeneous.

Financing of public spending is *centralised*: a common pool of resources is available to pay for both types of public consumption. Since tax distortions are not central to the argument, it can be assumed that these resources are equal to one unit of output in each period. Moreover, debt can be issued in the first period to cover deficit, but it must be repaid in the second period. All this implies that the government budget constraint in the two periods can be written as follows:

(4.14.a) $g_1 = g_1^L + g_1^R = 1 + b$ and (4.14.b) $g_2 = g_2^L + g_2^R = 1 - b$

where b denotes debt.

Spending instead is *decentralised*: in each period, both parties simultaneously and non co-operatively propose a spending level g_t^i for their constituency. If the two proposals are jointly feasible (in the sense that they imply a total public spending which is not larger than the total amount of resources available inclusive of debt), then they are implemented. If, instead, they are not, then each party gets half of the total available output (net of debt repayment in the second period). Formally:

(4.15.a) $$g_1^i = \begin{cases} p(g_1^i) \text{ if } p(g_1^i) + p(g_1^j) \leq 2 \\ 1/2 \quad \text{otherwise} \end{cases}$$

(4.15.b) $$g_1^i = \begin{cases} p(g_2^i) \text{ if } p(g_2^i) + p(g_2^j) \leq 1 - b \\ \frac{1}{2}(1-b) \quad \text{otherwise} \end{cases}$$

where $p(g_t^i)$ is the time t proposal of party i and the maximum amount of debt which can be issued in the first period under the assumption that it must be paid back in the second period is 1.

The model can be solved by backward induction. Consider the second period Nash strategy. Since utility is strictly increasing in g_2^i, both parties go for the whole pie: $p(g_2^i) = 1\text{-}b$. However, these two proposals are not jointly feasible and hence each party will get half of total feasible spending:

(4.16) $g_2^R = g_2^L = \frac{1}{2}(1-b)$ and total spending is $g_2^* = 1 - b$.

In the first period, bidding for the whole pie is not costless (as instead it is in the second period) since higher spending in period 1 reduces the resources available to finance spending in period 2. Spending in the two periods are linked through equation (4.16). To see this, use equation (4.16) to define the second period utility in equation (4.13):

$$(4.17)\quad U^i = u\left(g_1^i\right) + u\left(\frac{1-b}{2}\right)$$

From budget constraint (4.14.a), $b = (g_1^R + g_1^L - 1)/2$. Equation (4.17) can be immediately rewritten as:

$$(4.18)\quad U^i = u\left(g_1^i\right) + u\left[1 - \frac{(g_1^i + g_1^j)}{2}\right]$$

The first order condition for the maximisation of (4.18) yields:

$$(4.19)\quad u_g\left(g_1^i\right) - \frac{1}{2}u_g\left[1 - \frac{(g_1^i + g_1^j)}{2}\right] = 0$$

where a subscript g on u denotes the first derivative of the u function w.r.t. to argument g.

Equation (4.19) implicitly determines the proposal of party i in period 1. The symmetry of the problem implies that $p(g_1^i) = p(g_1^j)$ which in turn guarantees that proposals are implementable. Given the assumption that the function u is concave, the first order condition also implies that $g_1^i > g_2^i$ and hence that $g_1^R + g_1^L > g_2^R + g_2^L$ or $g_1 > g_2$. Since $g_1 = 1 + b$ and $g_2 = 1 - b$, then for g_1 to be greater than g_2 it must be that $b > 0$: in equilibrium, a positive amount of debt is issued.

This result can be compared with what would be obtained if the two parties co-operate (centralised spending setting) or if a benevolent social planner that weighs the two constituency equally was in charge of fiscal policy making. The maximisation problem would be defined as:

(4.20) $\max_{g_1,g_2} u(g_1)+u(g_2)$ subject to $g_1 + g_2 \leq 2$

The corresponding first order condition is:

(4.21) $u_g(g_1) = u_g(g_2)$

so that in equilibrium $g_1 = g_2 = 1$, $g_t^i = ½$ and $b = 0$.

The intuition behind the result is that in the decentralised spending setting, each party internalises only ½ of the cost of current spending (see equation (4.18)) and this represents an incentive to overspend in the first period. Notice also that the larger the number of parties fishing from the common pool of resources, the greater the equilibrium level of debt in the first period. This is clear since with n parties each of them internalises only $1/n$ of the cost of current spending. In the centralised spending setting (co-operation or benevolent social planner), costs of current spending are fully internalised and public consumption is smoothed over time to maximise the concave utility function of individuals.

Persson and Tabellini (1998) introduce private consumption in the utility function and consider a different rule for the allocation of spending in case the two proposals are not jointly feasible. More specifically they assume that each constituency will receive a share of feasible spending proportional to the proposal of its party. This generates an incentive for parties in the second period to bid for the whole pie, so that the Nash equilibrium is identical to the one obtained under the rule stated by equations (4.15.a) and (4.15.b).

Hallerberg and Von Hagen (1997) discuss the impact of various budgetary arrangements and show that centralisation of spending decisions into the hands of a powerful ministry of finance or commitment to negotiated fiscal targets partially solve the problem of fishing from the common pool. They further argue that the type of budgetary institutions (centralisation, fiscal targets, decentralised spending) adopted in any given country depends on the electoral institutions existing in that country. So, for instance, delegation of spending decisions to a strong finance minister is more feasible in countries with plurality systems (UK and France). It is a much less viable option in countries with fragmented and ideologically heterogeneous coalitions, which typically adopt a proportional representation rule (Belgium, Finland, Netherlands and Italy before

1993). In this sense, electoral institutions affect fiscal policy not directly, but indirectly through their impact on the range of feasible budgetary institutions.

Roubini and Sachs (1989a,b) construct an index of power dispersion that takes value 0 for one-party majority governments, 1 for coalitions of two or three parties, 2 for coalitions of more than three parties and 3 for minority governments (which are thus considered by default to be more dispersed). They obtain a significant positive estimated coefficient on that index in their regressions of the long-run value of the ratio of government spending to output and of the change in the debt to GDP ratio for a group of industrial countries over the 1960-1985 period. Edin and Ohlsson (1991) point out that the Roubini and Sachs index is in the nature of an ordinal (categorical) variable and hence its estimated coefficient cannot be given usual partial derivative interpretation. By using a set of dummy variables they also show that, in the same sample considered by Roubini and Sachs, what really matters for budget deficit is the majority vs. minority status of the government rather than the coalition effect. De Haan and Sturm (1994) use the same index as Roubini and Sachs of dispersion and obtain that it does not significantly affect budget deficit and government spending in the group of EU countries during the '80s. In a subsequent paper (De Haan and Sturm, 1997) they extend the analysis to 21 OECD countries for the decade 1982-1992 and again reject the hypothesis that fragmentation (as measured by the above mentioned index) affects fiscal policy outputs. A similar conclusion is reached by Hahm et al. (1996). The findings reported by Franzese (1998) are supportive of the hypothesis only in the case of very high debt levels. Perotti and Kontopoulos (1999) undertake a systematic analysis of "fragmented fiscal policy". They measure fragmentation as the number of parties in a coalition and as the number of spending ministers in the cabinet and find that both are strongly correlated to fiscal outcomes in a panel of 20 OECD economies over the period 1960-1995.

Turning to the analysis of the role of budgetary and electoral institutions, Grilli et al. (1991) find that in countries where the electoral rule is proportional, deficits tend to be larger. Von Hagen (1992) constructs indicators of the strength of budgetary procedures based on a number of features (degree of centralisation of negotiations over budget, flexibility of budget execution, existence of long-term planning constraints, to mention just a few). Bivariate analysis shows that at least some of these indicators significantly correlates to fiscal discipline. Hahm et al. (1996) design indicators of strength of fiscal bureaucracy that to some extent depends on the degree of centralisation of spending decisions within the minister of finance. They find this index

to be an important determinant of deficit in their sample of nine parliamentary democracies. Hallerberg and Von Hagen (1997) successfully test their theory that electoral institutions determine budgetary institutions and these in turn affect fiscal deficit in the group of EU countries. Finally, Perotti and Kontopoulos (1999) define a set of variables aimed at reflecting procedural fragmentation. They test the hypothesis that deficit and expenditures are ceteris paribus smaller if (i) spending limits are set before the drafting of the budget, (ii) an individual (or a small committee) sets the budget before it is discussed in the parliament, (iii) the minister of finance or a small committee centralise and co-ordinate the process of collecting and reconciling bids from various parties. The first two aspects are found to play some role in the determination of expenditures and tax revenues, at least in some sub-periods of total sample period (such as the 1974-1983 decade) and especially when dummies are used to capture different degrees of importance of spending limits. The third aspect instead is found to be completely unimportant in statistical terms.

4.1.5. Summary of the testable predictions obtained from the models

The models surveyed in this Section yield a set of theoretical predictions that can be tested for the group of western European coalition systems. First, according to the arguments developed in Subsection 4.1.1, fiscal policy outputs should display an electoral cycle. In the attempt to increase their share of support, electoralist governments have an incentive to manipulate fiscal policy and systematically increase deficit and public spending in electoral and pre-electoral years.

Second, policymakers are likely to add partisan preferences to purely electoralist incentives. Such preferences will affect the preferred level of public spending as well as the relative size of the weights assigned to various objectives in the loss function. The theory presented in Subsection 4.1.2 and in Appendix A4.1 predicts that under left-wing governments, public expenditure (but not necessarily budget deficits) is effectively higher than under right-wing governments.

Third, when the incumbent faces a positive probability of being replaced in office by a successor holding different policy views, then an incentive can exist for this incumbent to use deficits strategically to tie the hands of the potential successor. It then follows, as shown in Subsection 4.1.3, that the size of deficit (and eventually of public expenditure) should be positively correlated to the degree of cabinet instability. In other words, high cabinet turnover and low duration in office generate higher deficits,

especially to the extent that alternation in office involves significant changes in the composition of the ruling coalition.

Fourth, the existence of a common pool of resources available to finance public spending can fuel predatory (non co-operative) behaviour from coalition partners. This is an instance of the "tragedy of the commons" investigated in Subsection 4.1.4. With centralised financing and decentralised spending, each actor involved in the process of budget formation internalises only a fraction of the future cost of public spending. The consequence is an over-issue of debt relative to the benchmark case where parties co-operate or where a benevolent social planner maximises social welfare under the assumption that all groups in the society are weighed equally. Thus, deficit and spending should increase in the degree of fractionalisation of the ruling coalition.

To reduce the adverse consequences of "fishing from a common pool", appropriate budgetary procedures can be identified. So, when budget formation is centralised in the hands of a strong finance minister or when fiscal targets are negotiated by coalition partners, deficit is expected to be smaller than what it would be in the absence of such arrangements. Finally, electoral institutions can affect fiscal policy formation directly, by inducing more fragmentation of the legislature and of the ruling coalition, and indirectly, by determining the type of budgetary institutions adopted in a given country at a given time. Henceforth, in countries with a proportional representation system, fiscal policy should be less tight than in countries with a plurality rule or a non-purely proportional system.

4.2 Econometric set-up

The theoretical predictions discussed in the previous Section are tested on a sample of annual observations for the 13 western European coalition systems (Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Sweden) over the period 1965-1995 [11]. The general form of the regression model is:

$$(4.22) \quad y_{it} = \mathbf{X}_{it}\mathbf{b}_1 + \mathbf{Z}_{it}\mathbf{b}_2 + \varepsilon_{it}$$

[11] Annual observations for cabinet-based political data are generated using the procedure described in Appendix A1.1.b of Chapter 1. Time series of economic indicators are sometimes not available prior to 1970. In this case the sample is restricted to 1970-1995. See Appendix A4.2 for additional information on sample size.

where i denotes a generic country and t a generic year, y_{it} is the fiscal variable of interest, $\mathbf{X}_{it}$ is a vector of observations on exogenous economic variables, $\mathbf{Z}_{it}$ is a vector of observations on exogenous political variables, $\mathbf{b}_1$ and $\mathbf{b}_2$ are two vectors of coefficients to be estimated and ε_{it} is a disturbance term.

As is well known[12], different estimators of the parameters in model (4.22) can be defined depending on the assumptions concerning the form of the disturbance term. The simplest assumption is that $\varepsilon_{it} \sim iid(0,\sigma^2)$ for any i and t and hence that observations are serially uncorrelated and that errors are homoskedastic across countries and times. If this is the case, then model (4.22) is equivalent to the classic linear regression model and it can be estimated by Ordinary Least Squares to obtain an *OLS pooled estimator.*

The assumption that disturbances are identically, independently distributed with zero mean and finite variance is most likely to be appropriate when the number of units of observation (n) is small relative to the number of periods of observation (T). In the case of my sample, $n = 13$ and $T = 36$ (although the panel is sometimes unbalanced), so that the panel is effectively a pooled cross-section time-series and OLS are likely to be the appropriate procedure. However, as an alternative assumption, the following structure for the error term might be considered:

$$(4.23) \quad \varepsilon_{it} = \alpha_i + \eta_{it}$$

where α_i represents the so-called *individual effect* and the random component η_{it} is taken to be uncorrelated to regressors.

A large proportion of empirical applications involves one of the two following assumptions about the individual effect: (i) α_i is uncorrelated with the variables on the r.h.s. of the regression model (assumption of orthogonality), (ii) α_i is correlated with the r.h.s. variables. If the orthogonality assumption holds, then the OLS estimator is asymptotically unbiased, but not efficient. A Feasible Generalised Least Squares estimator (*random effect estimator*) can be defined as OLS applied to a transformed model. If the orthogonality assumption does not hold, then a *fixed effect estimator* can

[12] See Johnston and Di Nardo (1997) for a textbook discussion of Panel data models and estimation procedures. More advanced material can be found in Hsiao (1986) and Matyas and Sevestre (1996).

be obtained from a least squares dummy variable model that includes a vector of country dummies.[13]

To discriminate between the three estimators, two statistical tests are available. The Breusch and Pagan test of homoscedasticity of disturbances (Breusch and Pagan, 1979 and 1980) is based on the Lagrange Multiplier test-statistic:

$$(4.24)\quad LM = \frac{nT}{2(T-1)}\left[\frac{\sum_i\left(\sum_i \hat{u}_{it}^{pooled}\right)}{\sum_i \hat{u}_i^{pooled\,\prime}\,\hat{u}_i^{pooled}} - 1\right]$$

where $\hat{u}_{it}^{pooled}$ are the residuals when model (4.22) is estimated by OLS. The null hypothesis of the test is that disturbances are homoscedastic. Therefore, large values of the LM test-statistic favour the random and fixed effect estimators against the pooled OLS.

The Hausman test of orthogonality (Hausman, 1978) is based on the following statistic:

$$(4.25)\quad H = (\hat{\mathbf{b}}_{\mathbf{RE}} - \hat{\mathbf{b}}_{\mathbf{FE}})'(\mathrm{var}[\hat{\mathbf{b}}_{\mathbf{FE}}] - \mathrm{var}[\hat{\mathbf{b}}_{\mathbf{RE}}])^{-1}(\hat{\mathbf{b}}_{\mathbf{RE}} - \hat{\mathbf{b}}_{\mathbf{FE}})$$

where:

$\mathrm{var}[\hat{\mathbf{b}}_{\mathbf{FE}}] = \hat{\sigma}_\eta{}^2[\mathbf{X}'\mathbf{M}_\mathbf{D}\mathbf{X}]^{-1}$ and $\hat{\sigma}_\eta{}^2 = \dfrac{\sum_i\sum_t(y_{it} - \mathbf{d}_\mathbf{i} - \mathbf{b}'\mathbf{X}_\mathbf{it})}{nT - n - K}$, K is the number of regressors, $\mathbf{M}_\mathbf{D}$ is an idempotent matrix, FE denotes fixed effect estimator, RE denotes random effect estimator, $\mathrm{var}[\hat{\mathbf{b}}_{\mathbf{RE}}] = \hat{\sigma}_\eta^2\left[\mathrm{var}[\hat{\mathbf{b}}_{\mathbf{FE}}] + T\psi\sum_{i=1}^{n}(\overline{\mathbf{X}}_\mathbf{i} - \overline{\mathbf{X}})(\overline{\mathbf{X}}_\mathbf{i} - \overline{\mathbf{X}})'\right]$ and $\psi > 0$.[14]

[13] See Judge et al. (1985) for technical details on the definition of the two estimators.

[14] Technically, the random effect estimator is defined as the weighted average of the between estimator (which is the OLS estimator of a model collapsed into country averages) and the within estimator (which is the OLS estimator of a model expressed in deviations from country averages). The parameter ψ represents the relative weight of the between and within estimators in the definition of the random effect estimator.

The null hypothesis of the Hasuman test is that the random effect estimator is most appropriate. Large values of the test statistic thus imply that the fixed effect estimator has to be favoured over the random effect one.

In what follows I report and discuss results obtained from the estimator which is favoured by the joint consideration of the two tests just described (the last raw of each table in Appendix A4.2 indicates the favoured estimator). It will turn out that the OLS estimator is preferable most of the times and, more generally, results are not qualitatively much different across different estimators.[15]

4.3 Model specification and variables definition

Model (4.22) is used to estimate the impact of political and institutional variables on spending, taxation and budget decisions. Dependent variables are therefore defined as follows. In line with the literature, deficit (DEF) is constructed as the annual change in the debt to GDP ratio (results are not qualitatively different from those I discuss below if, following Roubini and Sachs, 1989a, GNP is used instead of GDP). With respect to expenditures and revenues, the problem is to choose which components should be considered. For instance, Perotti and Kontopoulos (1999) use first differences of total primary expenditure (inclusive of capital expenditure, government consumption and transfers) and total primary revenues (inclusive of direct taxes on households and business, indirect taxes, social security and payroll taxes). They also estimate regressions for individual components of spending (e.g. transfers and government consumption). Following the same strategy, I found that government consumption expenditure (inclusive of subsidies and transfers) on the spending side and total tax revenues (inclusive of indirect taxes) on the revenues side are the aggregates that appear to incorporate political incentives more than the others. Thus, in addition to DEF, the other two dependent variables for model (4.22) are defined as: (i) the first difference in the government consumption expenditure to GDP ratio (DG) and (ii) the first difference in total tax revenues to GDP ratio (DT). [16]

[15] For some of the regressions, the panel is unbalanced. When this is the case, the above described estimators are corrected as suggested by Verbeek and Nijman (1996).

[16] The main effect of including capital expenditure in the definition of DG is a reduction in the level of significance of several economic and political variables, without any relevant change on the sign and relative size of the estimated coefficients being observed. Similar changes are determined when indirect taxes are excluded from the definition of DT.

4.3.1. Regressors: economic variables

In the regression of the change in the debt to GDP ratio, the following four economic variables are entered on the r.h.s.: the lagged value of deficit (DEF_{-1}), the change in the rate of unemployment (DU), the change in the rate of output growth (DY), the change in the difference between the real interest rate and the rate of GDP growth times the lagged debt-to-GDP ratio (Dr).

The lagged value of deficit DEF_{-1} is needed to account for slow adjustment of deficit. Henceforth its estimated coefficient is expected to be positive, but smaller than one. Notice also that with a panel characterised by a relatively long time dimension and a relatively small cross-section dimension the effective degree of bias generated when estimating the model with a lagged dependent variable by either the random effect or the fixed effect is negligible. Moreover, for most of the specifications that include lagged deficit, the pooled OLS estimator turns out to be the most appropriate one.

The tax smoothing approach predicts that deficits are counter-cyclical: they increase during recessions and decrease during expansions. Being a direct measure of the cycle, the change in the rate of output growth, DY, should display a negative estimated coefficient. The opposite is true for the change in the rate of unemployment, DU, for which a negative coefficient is expected. It is important to point out that a problem of joint endogeneity between the dependent variable and the economic control variables could arise to the extent that the size of deficit affects GDP growth and unemployment. As noted by Perotti and Kontopoulos (1999), a complete solution to this problem is yet to be identified. They suggest checking the robustness of the results on the political variables by re-estimating the model after dropping economic variables and see whether any changes occur. I undertook such a test of sensitivity of results and obtained that the key findings with and without economic variables are very similar, although the overall fit of the model appears to be higher when economic variables are included.

The change in the difference between the real interest rate and the rate of GDP growth times the lagged debt-to-GDP ratio Dr is added to capture the effects of changes in the cost of servicing debt. When the real rate of interest grows faster than output, governments might be tempted to compensate the increased burden of debt through fiscal policy. It then follows that the estimated coefficient on Dr is expected to be positive.

When the dependent variable is either the change in government consumption expenditure or the change in tax revenues, only DY and DU are used as control variables. Of course, in the regression of DG, the coefficient on DY should be negative and the one on DU should be positive. The opposite is expected in the regression of DT.[17]

This specification of the set of economic variables is common to virtually all the empirical literature on this topic. Of all the contributions mentioned in Section 4.1, only Perotti and Kontopoulos (1999) significantly innovate by adding the rate of inflation of the consumers price index. When I include the inflation rate in the model, results on the political variables are not significantly different from those I discuss below. The same is true when the group of economic variables is enriched to include dummies for the oil shocks and the end of the Bretton-Woods system, the lagged value of debt and the share of population aged over 65.

4.3.2. Regressors: political and institutional variables

Below I define the indicators used to test the predictions obtained from the models of Section 4.1. They are divided in four groups: (a) indicators that can be used to test the theories of endogenous elections outcome and fiscal illusion, (b) indicators of the ideological location of governments, (c) indicators of government instability, cabinet duration and turnover in office, (d) institutional dummies. Technical details can be found in Appendix A4.3.

4.3.2.a Indicators used to study the electoral cycle of fiscal policy

Two simple dummy variables are defined. ELE takes value 1 in the pre-electoral year, if elections are held in the first or in the second quarter of the electoral year, and value 1 in the electoral year, if elections are held in the third or in the fourth term of the electoral year. ELX takes value 1 in the electoral year, independently from the quarter of the elections. The existence of an electoral cycle of fiscal policy would be revealed by statistically significant estimated coefficients on the electoral dummies. More specifically, as argued in Subsection 4.1.1, in the attempt to increase the probability of being re-elected, electoralist incumbents will maintain higher deficits and expenditures

[17] Throughout this Chapter I follow the standard approach in the literature and use cyclically non-adjusted data. Additional details on economic variables are given in Appendix A4.3.

in electoral and pre-electoral years, so that estimated coefficients on the dummies should be positive when DEF and DG are the dependent variables and negative when DT is the dependent variable in model (4.22).

4.3.2.b Indicators used to test the role of ideology of governments

The key problem in implementing a test of the models that predict partisan cycles of fiscal policy is the appropriate definition of what determines the ideology of the government. The strategy adopted by most authors is to look at the proportion of parliamentary seats and/or cabinet ministers held by left-wing and right-wing parties to construct indicators of ideological location of the policymaker on the Left-Right policy space (see, inter alia, Roubini and Sachs, 1989a; De Haan and Sturm, 1994; Borrelli and Royed, 1995; Woldendorp et al. 1998 and Volkerink, 1999). The implicit assumption underlying this strategy is that the impact of any party on the process of policy formation is somehow proportional to its size, whether this latter is represented in terms of seats held in the legislature or in terms of portfolios controlled by party's representatives.

The role that a party plays in decision-making depends on the structure of the decision-making process itself. As already pointed out in Section 2.2 of Chapter 2 (Subsection 2.2.1), political scientists define four structures that have some empirical relevance in post-war Europe: (i) *cabinet government*, (ii) *party government*, (iii) *prime-ministerial government*, (iv) *ministerial government* (see, Laver and Shepsle, 1994, Chapter 1). In a cabinet government, decision-making is effectively a collective activity to which all ministers contribute. In a party government, decisions are essentially made by party leaders (whether or not sitting in the cabinet) engaged in legislative bargaining. In a prime-ministerial government, decisions are heavily affected by the preferences of a strong prime minister. In a ministerial government, the decision-making process displays a strong departmental character, so that the contents of the policy undertaken on a given issue closely reflect the preferences of the party controlling the portfolio with jurisdiction over that issue.

It is clear that a measure of ideological location based on the share of seats or portfolios controlled by left-wing (or right-wing) parties is appropriate when decision-making can be characterised as a party government or a cabinet government, but not in the other two cases. Given that the empirical relevance of prime-ministerial and ministerial governments cannot be neglected (see the collection of country reports in

Browne and Dreijmans, 1994 and Laver and Shepsle; 1994), I prefer to construct four different measures of location (one for each possible structure) and then to see which of them has the strongest explanatory power in the fiscal policy regressions. The technical procedure for the construction of these measures is as follows (see also Appendix A4.3).

The starting point is represented by the information provided by the Left-Right policy scales discussed in Appendix A1.1 of Chapter 1. Then, the ideological location of a government is defined as the weighted average of the cardinal locations of the parties in the ruling coalition, with weights designed to represent the different structures of the decision-making process above mentioned. So, LOC1 is associated with the *cabinet government* structure and the weight assigned to the location of each party is equal to its share of portfolios. LOC2 is associated with the *party government* structure and weights are equal to parties' share of coalition seats. LOC3 is associated with the *prime-ministerial government* and a weight equal to 1 is assigned to the location of the party controlling the office of prime-minister (zero is the weight assigned to the location of all the other parties). Finally, LOC4 is associated with the *ministerial government* structure and weights are equal to the share of key portfolios controlled by each coalition partner. A word of comment is perhaps necessary for this last measure LOC4. The fact that decision-making is strongly decentralised at departmental level, combined with the observation that voters and politicians focus their attention to a relatively small subset of the total set of policy dimensions implies, that most of the decision-making power is in the hands of ministers/parties in control of *key portfolios*; that is, of those portfolios with jurisdiction over the most important dimensions of the policy space. It thus follows that the ideological location of the ministerial government is largely determined by the ideology of parties controlling such key portfolios. Eventually, a strong version of LOC4 can be designed in which a weight equal to 1 is assigned to the location of the party in control of the key Portfolio of Finance, the one with jurisdiction over budget formation.

The four measures of location just described are cardinal in the sense that their estimated coefficients can be given partial derivative interpretations. They take values in the interval [1, 10] and larger values correspond to more right-oriented governments. In addition to the cardinal LOC variables, a full set of dummies is constructed. [18] ID is a dummy taking value 1 if in a given country in a given year the ideological location of

[18] If more than two governments were in office in a given year, so that two different measures of location can be computed for that year, then LOC is the weighted average of these two measures, with weights equal to the proportion of time each government stayed in office.

the incumbent is to the right of the median value 5.5. That is, ID is based on a bi-partition of the policy space and it is coded 1 for right-wing governments. Clearly, there are four versions of ID, each corresponding to a specific cardinal measure LOC (i.e. ID1 is constructed from values of LOC1, ID2 from values of LOC2, and so on). IDL is a dummy taking value 1 if in a given country in a given year the corresponding LOC variable is to the left of the threshold value of 4.6. IDC takes value 1 when the corresponding LOC measure is to the right 4.6, but to the left of 6.4. IDR takes value 1 when the corresponding LOC measure is to the right 6.4. Thus, IDL, IDC and IDR are based on a tri-partition of the policy space (Left, Centre and Right). Again, four sets of dummies IDL, IDC and IDR are defined, one for each of the four cardinal measures LOC (i.e.IDL1, IDC1, IDR1 are constructed from values of LOC1; IDL2, IDC2, IDR2 are constructed from values of LOC2, and so on).[19]

The theoretical prediction incorporated in the model of Subsection 4.1.2 is that left-oriented governments tend to promote greater spending than right-oriented governments do. Since LOC is higher the more oriented towards the right the government is, its estimated coefficient in the regression of DG (change in the government consumption expenditure to GDP ratio) is expected to be negative. If dummies are used, then IDL should display a positive coefficient and IDR a negative one. ID should instead be associated to a negative coefficient. Given that it is often maintained that left-oriented governments also tax more, the same pattern of estimate coefficients should be observed in the regression of DT (change in tax revenues to GDP ratio). No clear-cut prediction can be made, however, on the sign of the estimated coefficients of the measures of ideology when added to a regression of DEF (change in the debt to GDP ratio). This follows on from the fact that theoretical arguments do not necessarily predict that left-wing governments are associated with larger deficits.

4.3.2.c Variables used to test the role of government instability

Government instability is commonly represented in the literature by the number of cabinet changes observed in a given year (or period of time), or by the average cabinet

[19] The threshold values 4.6 and 6.4 divide the space of observed locations into three parts of identical length. Sensitivity analysis shows that widening the distance between the two thresholds (that is, widening the Centre) does not affect results on the dummies IDL, IDC and IDR. Similarly, reducing the size of the Centre does not produce any qualitative change up to the thresholds 5.0 and 6.0. When the thresholds are set to the right of 5.0 and to the left of 6.0 results are practically identical to those obtained with the dummy ID.

duration in office. However, a strict interpretation of the model discussed in Subsection 4.1.3. suggests that what determines deficit (or debt growth) is the existence of a positive probability that the incumbent will be replaced in the near future. Clearly, the existence of a positive probability that an event will be observed does not necessarily mean that this event is actually observed. Thus, according to the theory, deficit could be realised even in the absence of effective government transfers and only as a consequence of the fact that there is a positive probability that transfers will occur. It then follows that the lack of a statistically positive correlation between observed transfers and deficit (or debt growth), as sometimes found in the literature (see Volkerink, 1999) does not necessarily invalidate the government instability argument.

To shed additional light on this issue, I estimate the probability that a government will be replaced by probit analysis and use this probability as an indicator of instability. The expectation is that if fiscal policy is used to tie the hands of a potential successors, then the indicator will display a positive coefficient in the regressions of DEF and DG. Furthermore, in the theoretical model the incentive to use debt strategically arises to the extent that the incumbent and its potential successors are different in terms of composition of the ruling coalition, allocation of portfolios and policy preferences. If a transfer is likely to happen, but is also unlikely to generate major political changes, then the myopic incentive for the incumbent to accumulate debt is much reduced.[20] In other words, for any degree of instability (that is, for any given value of the probability that a cabinet will be replaced), the impact on fiscal policy is stronger, the more relevant (in political terms) the changes that a replacement is expected to bring about are. For this reason, the indicator of instability obtained from probit analysis is weighed by the past average alternation in office (ALT) and portfolios volatility (TPV, PPV and IPV).[21]

4.3.2.d Variables used to test the role of fragmentation of political power

The theoretical argument proposed in Subsection 4.1.4 builds on the assumption that two or more parties contribute to the process of policy formation. As previously

[20] In terms of the formal model, this is equivalent to saying that the two parties have identical policy preferences (for instance their platform converge to $\alpha = ½$). Then, the fact that the incumbent is replaced with probability p has no impact on the pattern of public expenditure.

[21] ALT, TPV, PPV and IPV have been all previously introduced in Chapter 2 (See Appendix A2.4). ALT is defined as the sum of shares of parliamentary seats held by parties entering the government plus the shares of parties leaving the government. TPV is the total number of portfolio transfers observed between two consecutive cabinets. PPV is the number of portfolio transfers occurring between any two different parties in two consecutive cabinets. IPV is the number of portfolio transfers between different parties weighed by the ideological distance between the parties.

suggested (see footnote 10), this is most likely to be the case when the government is formed by a coalition of parties or by a single-party that does not control the majority of seats in the parliament and therefore needs to gain external support. The index of fragmentation of Roubini and Sachs (1989 a,b) is effectively constructed so as to incorporate this idea: the score is increasing in the number of parties in the ruling coalition and maximum score is assigned by default to minority governments. However, as first noted by Edin and Ohlsson (1991), this structure does not allow us to separate the coalition effect from the minority effect. For this reason, I prefer to use two simple dummy variables. The dummy COAL is coded 1 when two or more parties share office, the dummy MIN is coded 1 when the government is single-party minority. A joint term COAL*MIN can then be used to isolate the impact of minority coalition governments. According to this theory, these dummies should display positive coefficients in the regressions of DG and DEF.

Two additional features of the theoretical model of "fishing from the common pool" (which are also displayed by most models of government inaction and war of attrition) are that (i) current overspending and debt growth are not only larger when more than one party is involved in budget formation, but they are also increasing in the number of parties effectively involved, (ii) parties are characterised by different policy preferences.

The first feature suggests that in addition to the simple distinction of governments between single-party and coalitions and between majority and minority, it is desirable to provide a continuous measure of fragmentation. The effective number of parties in the coalition (ENP) is the natural candidate. For ENP the expectation is of a positive estimated coefficient. Perrotti and Kontopoulos (1999) use the absolute number of parties in the coalition (ANP). The difference between ENP and ANP is that the former takes into account the relative size of parties (see Appendix A2.4 and the variable description in Appendix A4.3), whilst the latter does not. Since parties' size might be a determinant of their ability to attract resources (possibly because it also reflects the size of their supporting constituencies), I believe that ENP is more appropriate than ANP. However, it is worth noting that results do not change when one is used instead of the other.

The second feature suggests, instead, that besides numerical fragmentation, one should also consider ideological fragmentation. If parties have exactly the same preferences over public consumption (because, for instance, they represent the same supporting constituency) or if their supporting constituencies equally weigh the various

types of public goods, then a co-operative equilibrium with full internalisation of the current costs of future spending is obtained in the model of Subsection 4.1.4. Similarly, in the basic model of war of attrition proposed by Alesina and Drazen (1991), if the two parties are not polarised, then immediate agreement is obtained and debt does not accumulate. In empirical terms, ideological fragmentation can be best represented by the variable CI introduced in Chapter 2. This is an indicator of the overall dispersion of the policy locations of parties in a government and hence it reflects the extent to which these parties are likely to hold different policy views. As for ENP, the expectation is that CI will display a positive coefficient to reflect that more dispersed governments are associated to less tight fiscal policy.

Finally, if budget formation is the outcome of intra-parliamentary bargaining (as opposed to intra-government bargaining), then the relevant concept of fragmentation refers to the legislature. The effective number of parties in the legislature (FRA) and the polarisation of the party system (POL) are therefore potential determinants of public spending and budget deficit. Technical definitions of these two variables have been given in Appendix A2.4. The expectation is that their estimated coefficient will be positive in the regression of both DG and DEF. In fact, the fragmentation of the legislature is most likely to matter when the government is a single-party minority one. For this reason, joint terms MIN*FRA and MIN*POL will be added to the set of regressors.[22]

4.3.2.e Variables used to test the impact of electoral insitutions and budgetary procedures.

Following Hallerberg and Von Hagen (1997), I define three dummy variables that account for cross-country differences in budgetary procedures. The dummy DELEGATION takes value 1 for the countries where fiscal powers are delegated to a strong Minister of Finance (France and Germany). The dummy CONTRACT takes value 1 for those countries where commitments to negotiated fiscal targets defined in contracts agreed upon by coalition partners are normally taken (Austria after 1985, Denmark after 1982, Finland, Ireland after 1987, Luxembourg and the Netherlands).

[22] It will be recalled from Chapter 2 that four different definitions of CI and three definitions of POL can be proposed. Here, I tried all of these definitions. The results reported are those obtained by using the definitions that have the best statistical performance: CI1 and POL1. Estimated coefficients obtained using other definitions display the same sign of those obtained using CI1 and POL1, but standard errors are slightly larger.

The dummy UNCONSTRAINED takes value 1 for the countries where none of the previous constraints is at work (Belgium, Italy and Sweden).[23] From the discussion in Subsection 4.1.4 it is clear that the fiscal effects generated by the tragedy of the commons are smaller in case of delegation and, perhaps to a smaller extent, in case of negotiated fiscal targets. Henceforth , the estimated coefficient on UNCONSTRAINED should be positive and larger than those on the other two dummies in the regressions of both DG and DEF.

Turning to electoral rules, most of the countries in the sample adopt a proportional representation system (PR). However, whilst some countries adopt a purely PR rule, others combine the PR rule with various procedures for the allocation of a quota of seats. I therefore define a dummy PR taking value 1 for purely PR systems and zero otherwise. Notice that the group of non purely PR systems includes a variety of alternative rules, such as the single transferable vote in Ireland, the plurality system in France, the 2-Tier PR system plus transfers for the reminder in Austria, Denmark, Italy (prior to 1993), Germany and Sweden. The prediction is that purely PR systems should be associated to less tight fiscal policy. This follows on from the argument that the electoral system influences the type of budgetary institutions adopted in a country and from the observation that a purely PR rule favours fragmentation of the legislature and of the executive (see again the discussion in Subsection 4.1.4). Henceforth, in the regressions of DG and DEF, PR should display a positive estimated coefficient

4.4 Econometric results: the political economy of fiscal policy formation in western European coalition systems.

The tables in Appendix A4.2 report the results of the estimation of various specifications of model (4.22). In each table, the first row reports the number of the Column, the second row the dependent variable and the last row the estimators favoured by the statistical tests mentioned in Section 4.2. The full set of results obtained with the non-favoured estimators is available from the author upon request as well as other results that are mentioned in the discussion, but not displayed in the Appendix.

Before focusing on the importance of the five sources of political bias, it is worth considering the purely economic specification of budget deficit in Column 1 of Table A4.1. All the estimated coefficients on the economic regressors are consistent with the *a*

[23] Due to the lack of information about their budgetary procedures, Norway and Iceland are dropped from the sample when the model specification includes these dummies.

priori expectations based on the tax smoothing model. In particular, there is evidence that deficits adjust slowly over time and exhibit a counter-cyclical behaviour. To check the robustness of this basic economic specification, dummies to account for the oil shocks and the end of the Bretton Woods system, the lagged value of debt-to-GDP ratio and the share of population aged over 65 have been added on the r.h.s. The coefficients on the four key variables do not change substantially, whilst those on the added variables are not statistically different from zero. Moreover, in order to control for the potential joint endogeneity of deficit and business cycle, DU and DY have been instrumented using their lagged values. Again, no significant changes in the estimated coefficients are observed. The results from the estimation of basic economic specifications of DG and DT are not reported. However, whilst for DG, the economic variables DU and DY display statistically significant coefficients consistent with a priori expectations, the same is not always true for DT, where coefficients are generally of the correct sign, but sometimes not different from zero. Again, the inclusion of other economic variables does not produce any relevant change.

I now turn to the discussion of the results on the political and institutional variables. At the end of this Section I will also comment on some results concerning the role of the ideological location of the median voter in fiscal policy formation.

4.4.1 Electoral cycle of fiscal policy: endogenous election outcomes and fiscal illusion.

In Column 2 of Table A4.1 the electoral dummy ELE is added to the basic economic specification to see whether the size of fiscal deficits displays any systematic pre-electoral pattern. It turns out that this is not the case: budget deficits are not significantly larger in electoral or pre-electoral years. The same conclusion holds when the dummy ELX replaces ELE. In addition to this, ELE (and ELX) does not seem to play any relevant role in the determination of consumption expenditure and taxation. In the regression of DG, ELE does display a positive coefficient, as the theoretical argument suggests, but this coefficient is not significant at usual confidence levels. Similarly, in the regression of DT, the negative coefficient on the electoral dummy fails to pass a zero restriction test. Based on this evidence, I suggest that in the western European coalition systems, over the time 1960-1995, there is little support for the hypothesis that governments use fiscal policy strategically to increase their chances to win at the next elections.

4.4.2 The ideological orientation of the policymaker.

In Column 3 of Table A4.1, the ideological variable LOC is included. The estimates reported are those obtained when the specific definition LOC4 is used to measure the ideology of the policymaker using a system of weights based on the share of key portfolios controlled by each party. Even if the key findings are unchanged when the other definitions of location are used, it is worth stressing that LOC4 (and the associated dummies) does seem to have superior econometric performance. That is, the level of significance of its estimated coefficient is higher and the general goodness of fit of the model is greater relative to the case when other definitions of LOC are used. Furthermore, in some regressions, when the variable LOC4 (or one of the associated dummies) is entered jointly with any of the other ideological variables, the coefficient on LOC4 retains its size and significance, whilst the one on the other ideological variable becomes not different from zero. In this sense, it could be argued that a system of weights based on the share of key ministers controlled by each party allows a better (more precise) econometric representation of the effective ideology of the policymaker. Further work on this point is certainly desirable.

With the favoured estimator (OLS), there seems to be no statistically significant correlation between ideology and size of fiscal deficit, once controlling for the economic determinants of fiscal policy. The result is confirmed when the dummy ID (defined over a simple bi-partition of the policy space) replaces LOC. However, when the dummies DL and DC (defined over a tri-partition of the policy space) are added some interesting results arise (Column 4 Table A4.1). The negative and significant coefficient on DL implies that leftist governments (located to the left of the threshold 4.6 on the ten points scale) maintain *smaller* deficits relative to rightist governments. This same difference shows up in a model where the three dummies DC, DL and DR are added jointly (and the constant term dropped). In this case, DR displays a positive and significant coefficient, thus rightist governments appear to sustain significantly *larger* deficits relative to leftist (and possibly centrist) governments. Notice that this finding does not contradict the standard argument, commonly advanced in the political economy literature, that left oriented policymakers tend to favour more public spending. As the estimated coefficients on the dummy ID in Column 5 and 6 suggests, leftist governments effectively spend more, but they also tax more (recall that ID takes value 1 when the incumbent is ideologically shifted to the left of the policy scale). In other

words, they appear to be more able than rightist governments to balance expenditures and revenues in aggregate. [24]

I can identify two possible, not mutually exclusive explanations for this result. The first has to do with the fact that, at least in the sample considered in this analysis, leftist governments are characterised by a lower degree of internal fragmentation; that is, they are supported by a smaller number of parties and/or by parties with relatively homogeneous policy views. This higher internal cohesion makes negotiations over budget formation significantly easier and hence it favours smaller deficits (see also Subsection 4.4.4). Evidence consistent with this explanation is provided in Column 7 of Table A4.1, where the estimated coefficients on the ideological dummies are found to be not statistically different from zero when the rough indicator of internal fragmentation COAL is added to the set of regressors.

The second explanation relies on the theory of "labour quiescence" developed by Cameron (1984). The analysis undertaken in Chapter 3 identified the ideological orientation of the government as one of the determinants of cabinet stability. Similarly, ideological dummies significantly enter the probit specification used in Subsection 4.4.3 to estimate the probability of a government collapsing. Henceforth, ideology determines stability and in turn stability can determine fiscal policy outcomes (see below), so that left-oriented governments, intrinsically more stable than right-wing ones, can deliver a more balanced budget.

4.4.3 Government instability

The standard approach in the political economy literature is to use the number of government changes in a given period as a proxy for government instability. Alternatively, the average duration of the cabinet or its survival rate (the ratio of duration to maximum time between two consecutive elections) can be entered the model specification to capture the impact of excessive turnover in office on the process of fiscal policy formation. I adopt a different approach, that follows the one in Alesina et al. (1996). First, I compute the probability of a government collapsing in country *i* in

[24] A possible reason why only tri-partition dummies (and not LOC and ID) display significant coefficients is that the relationship between ideology and size of deficit becomes more ambiguous for centrally located governments. This is a consequence of the nature of this governments, often rooted in a compromise between left and right and/or among several parties of different orientation. Tri-partition dummies allow to isolate the impact of centrist governments and they are therefore more likely to detect the existence of a linear relationship at the extremes of the political spectrum.

year t through the estimation of a binary choice model. Then, this probability is entered as a proxy for government instability on the r.h.s. of model (4.22).

A systematic analysis of the determinants of government duration in western European coalition systems is undertaken in Chapter 3. Building on those results, I choose a parsimonious specification for the binary choice model, that includes the political factors which are most likely to determine government collapse. The dependent variable of the model is a dummy TERM taking value 1 in years when a termination is observed. The model is thus specified as follows:

$$(4.26)\quad TERM_{it} = const + \gamma_1 TERM_{it-1} + \gamma_2 MAJ_{it} + \gamma_3 SING_{it} + \gamma_4 CI_{it} + \gamma_5 POL_{it} + \gamma_6 DL_{it} + \gamma_7 GR_{it} + \gamma_8 GR_{it-1} + \varepsilon_{it}$$

where *const* is the intercept and *GR* the growth rate of GDP, MAJ = 1-MIN, γ's are the coefficient to be estimated and all the other variables are as described in Section 4.3.

The specification of model (4.26) incorporates the idea that government termination depends on the past history of terminations (a form of *duration contagion*), on several characteristics of the party system and of the ruling coalition (including its ideological location) and on the economic performance as captured by the growth rate of GDP. Both a probit and a logit version of model (4.26) are estimated. Additionally, a basic specification where only the lagged value of TERM and the dummies MAJ and SING enter the r.h.s. Results are reported in Table A4.2.

From the set of estimates in Table A4.2, four different series of the probability of a government collapsing are obtained. These represent the proxies for the degree of government instability (INSTAB). In the models of Table A4.4, INSTAB is used as an explanatory variable in the regression of DEF and DG. Notice that whilst the table reports the estimates when INSTAB is computed from the probit version of model (4.26), nothing really changes when the other series of INSTAB are used instead.

The results in Column 1 of Table A4.4 are not supportive of the theoretical argument of strategic use of debt in countries with high instability: the coefficient on INSTAB does not pass a zero restriction test. However, it might be the case that instability only really matters when government changes involve significant alternation in office and/or volatility of portfolios. As a matter of fact, not necessarily a termination implies a significant change in the composition of the government or of the ruling coalition or even in the allocation of portfolios. For example, in Italy prior to 1993 the

cabinets death rate is very high, but the core of the ruling coalition has remained substantially unchanged for long spells. A similar situation has occurred in Finland and, to some extent, in France. The basic theoretical argument incorporated in the models of strategic use of debt states that large deficits will be run by the incumbent only when he faces a positive probability of being replaced by a *different* party (or coalition of parties). Thus, for a more appropriate test of this hypothesis, the variable INSTAB should be weighted by a measure of the effective degree of change in office. The past observed values of the indicators of portfolios volatility PPV and of alternation in office ALT are here used as weights. The interactive terms INSTAB*ALT and INSTAB*PPV do display the expected positive and significant coefficients (Column 2 and 3 of Table A4.4), thus providing supporting evidence to the theory of strategic accumulation of debt in the presence of high government volatility (the same is true when INSTAB is weighted by the other two indicators of volatility TPV and IPV). A similar result is obtained in the regression of DG, where the interactive term TERM*ALT is used instead of INSTAB*ALT. Notice also that all these results concerning the role of instability are robust to the inclusion of the ideological dummies, in spite of the fact that a dummy DL significantly enters model specification (4.26). This means that the incentive to spend more and to sustain larger deficits in periods of high instability exists for any incumbent policymaker, no matter what its ideological location..

One issue that deserves specific consideration when estimating the impact of instability on fiscal policy is that of possible reverse causation. That is, it could be the case that larger fiscal deficits (as indicators of bad economic performance) induce higher cabinet instability. To test this hypothesis, the binary choice model (4.26) has been re-estimated, adding DEF to the set of regressors. Interestingly, very few changes are observed on the size and the standard errors of the estimated coefficients on the other regressors, whilst the estimated coefficient on DEF, albeit positive, remains statistically not significant at usual confidence levels. The same results are obtained when DEF is one period lagged. Thus, there is evidence that the size of the deficit does not affect the turnover in office.

As a further check, the interactive terms INSTAB*ALT, INSTAB*TPV, INSTAB*PPV, INSTAB*IPV have been instrumented by their lagged values. In fact, the estimated coefficients on these variables now display larger standard errors, but still remain significant at usual confidence levels. Again, no relevant changes appear for the other regressors.[25] Future research in this area could further investigate the issue of joint

[25] All these results are available from the author upon request.

endogeneity of instability and deficit by estimating appropriate systems of simultaneous equations, as Alesina et al. (1996) do for the case of economic growth and political instability.

4.4.4 The degree of internal cohesion, fragmentation of the decision making process and polarisation of the legislature.

As predicted by the theory of fishing from the common pool, coalition governments tend to be associated to significantly larger budget deficits. This results from the positive coefficient on COAL in Column 1 of Table A4.4. Interestingly, and possibly a bit surprisingly, the evidence reported in Column 2 suggests that the minority status is instead not necessarily a disadvantage (in terms of ability to balance the budget): the coefficient on the dummy MIN is negative and statistically different from zero at usual confidence levels. Clearly, this finding contradicts Edin and Ohlsson (1991). Furthermore, among the group of minority governments, a clear difference exists between those formed by just one party and those supported by coalitions. In Column 3, when the joint term COAL*MIN is added to the specification of Column 2, the coefficient on MIN remains negative, whilst the one on the joint term is positive. This means that only single-party minority governments are not disadvantaged. A possible interpretation for this pattern of findings is that budget formation is mostly the outcome of intra-government bargaining rather than intra-parliamentary bargaining and hence single-party governments (whether majority or minority) do not suffer from the tragedy of the commons problem. This problem would only affect coalition governments (whether majority or minority). In this sense, the coalition effect would prevail on the minority effect.

In the discussion of Subsection 4.3.2.e the point is made that the strength of the coalition effect is increasing in the degree of numerical and ideological fragmentation of the coalition. This argument is not supported by the evidence. None of the continuous measures (ANP, ENP and CI) of fragmentation seem to play a significant role in fiscal policy formation (debt growth, change in expenditures or taxation); not even when combined with the two basic dummies COAL and MIN (Column 4 of Table A4.4 reports the results when the variable CI is combined with the majority dummy MAJ = 1-MIN). Henceforth, in terms of fiscal policy formation, the key difference is between single-party governments and coalition governments and not between different types of coalitions.

The previous conclusion, that intra-parliamentary bargaining is not relevant for fiscal policy formation, has to be partially amended in the light of the results displayed in Column 5. Here, a joint term MIN*POL is entered in addition to MIN to check whether minority governments are effectively less able to control the deficit when the system is more polarised. This turns out the be the case: the dummy MIN retains its coefficient, whilst the one on the joint term is positive. Thus, the minority status is not necessarily a disadvantage, but when the parliament is characterised by some relevant degree of ideological conflict, then minority governments find it less easy to balance the budget. The same result holds in a regression of DG. Notice also that the measures of fragmentation of the legislature POL and FRA never display significant coefficients when entered alone on the r.h.s. of the model.

4.4.5 Budgetary institutions

When entered jointly, the dummies DELEGATION, CONTRACT and UNCONSTRAINED all display a positive coefficient.[26] However only the one on UNCONSTRAINED is statistically different from zero. Notice also that this coefficient is the largest of the three. Thus, there is evidence that in countries where fiscal policy-making is not centralised or coalition partners do not agree upon fiscal targets, deficit (and spending) are higher than in other countries. In a regression of DT, both UNCONSTRAINED and CONTRACT are found to have positive and significant coefficients. This implies that the adoption of a procedure such as the centralisation of the process in the hands of a strong Ministry of Finance effectively promotes lower spending and, more interestingly, less recourse to distortionary taxation. When the dummies are entered one or two at the time in the regression of DEF and DG, results are not significantly altered. UNCONSTRAINED always displays a positive and significant coefficient which is larger than the one on the other two dummies. When DELEGATION is entered alone, then its coefficient becomes negative and significant at the 10% confidence level. This finding further reinforces the conclusion that centralisation helps to undertake a tight fiscal policy by reducing the effect arising from the tragedy of the commons. In the regression of DT, both UNCONSTRAINED and CONTRACT retain their positive coefficients when entered alone, and also when

[26] The coding of any of the three dummies is constant for any given country (unit of observation). This implies that a fixed effect estimator cannot be computed. However, both OLS and random effect can be estimated, with OLS that always appears to be favoured by statistical tests.

entered together without DELEGATION. The coefficient on CONTRACT is usually larger. Overall, it seems that centralisation of fiscal policy decisions in the hands of a strong Minister of Finance effectively helps to reduce both spending and distortionary taxation relative to the absence of similar arrangements.

Proportional representation systems do not appear to sustain systematically larger deficits (Column 2, Table A5.4). However, in these systems, the increase in government consumption expenditure appears to be significantly larger than in other countries (Column 3, Table A5.4). These latter results are robust to the inclusion of several other political variables (such as the measure of fragmentation of the party system, the index of cabinet instability and the dummies for the ideological location of the median voter) and of the dummies that account for cross-country differences in budgetary institutions. Therefore, the hypothesis that electoral institutions matter only because they contribute to the determination of the type of budgetary institutions at work in any given country might not be the end of the story. As suggested by Persson and Tabellini (1998), the analysis of comparative politics, relating the size and composition of government spending to the political system in general and the electoral system in particular, is a promising area for future research. One constraint that I encounter in conducting such an analysis on the sample of western European coalition systems is the relatively small variation in the type of electoral rule adopted by countries. Extension of the analysis to other countries is therefore desirable in future work.

4.5. The ideological location of the median voter.

Theoretical models often assign the median voter a pivotal role in the determination of fiscal policy choices. It is therefore interesting to investigate to what extent the ideological orientation of the electorate (as summarised by the ideological orientation of the median voter) contributes to the explanation of fiscal policy formation in coalition systems.

To address this issue, a measure of the ideological location of the median voter must be computed from the data available on the preferences expressed by voters in political elections and the location on the ideological scales of the parties competing in these elections. The approach I use is a straightforward extension of the one suggested by Laver and Schofield (1990) to compute the location of the median legislator. In particular, I order political parties from left to right. Each party is identified by a specific number indicating its location on a ten point Left-Right scale. Then, I add the

share of votes received by each party, counting from left to right. Eventually, there will be a party whose share added to those of the parties on its left makes the cumulative sum of shares larger than the threshold 50.1%. The ideological location associated to this specific party can be taken as an approximation of the ideological location of the median voter. Then, dummies can be constructed exactly in the same way as they are constructed to represent the ideological location of the policymaker (see Subsection 4.3.2.b above). Thus, IDMV is coded 1 when the median voter is located to the right of 5.5 on the 10 points ideological continuum, IDMVL takes value 1 if the median voter is located to the left of 4.6, IDMVC is coded 1 if the median voter is located between 4.6 and 6.4 and IDMVR is coded 1 if the median voter is located to the right of 6.4.

The last three columns of Table A4.5 report the results concerning the role of the median voter. Before commenting on these figures, it is worth spending a few words on the relationship between the ideological location of the median voter and that of the policymaker. Most theoretical models assume that these two coincide.[27] A comparison between the dummies based on a bi-partition of the ideological space (ID4 and IDMV) yields that in 94 out of 305 observations the two are coded differently. That is, in 94 cases, the estimated location of the median voter was on the left whilst the one of the policymaker was on the right, or vice-versa. When instead the dummies based on a tri-partition of the space are considered, the number of cases where coding is different drops to 89 out of 305. A simple probit regression of ID on a constant and IDMV (to test to what extent the location of the median voter is correlated to the one of the policymaker) yields an estimated coefficient on IDMV equal to 1.268971, with a standard error of .166803 and a p-value of .000. The restriction that the coefficient on IDMV is equal to 1 can be rejected at the 10% level of confidence. Without the constant, the coefficient on IDMV is .375643 and the p-value is .001, the restriction that the coefficient on IDMV is equal to 1 can be rejected at all confidence levels. Similar results are obtained when the probit regression is estimated for the dummies based on the tri-partition of the policy space. Overall, this evidence is supportive of the idea that, albeit positively correlated, the location of the median voter and the location of the policymaker do not necessarily coincide. This should not be surprising: in coalition systems, the continuous need for political bargaining in cabinet formation and duration

[27] According to the median voter theorem, the ideology of the policy-maker coincides with the ideology of the median voter. However, this result is typically obtained for the case of two-party majoritarian systems and not for coalition systems, where the political bargaining process that leads to government formation is most likely to generate a discrepancy between the two ideologies.

(as explained in Chapters 2 and 3) makes it more likely that the ideological preferences of the electorate are only imperfectly represented by the orientation of the policymaker.

In Column 4 of Table A4.5 both the location of the median voter and the location of the policymaker are included on the r.h.s. of a DEF regression. The large standard errors of the estimated coefficients on the ideological dummies might be a symptom of multicollinearity. More precise estimates are obtained in Column 5 and 6. In the regression of DG (Column 5), only the dummies reflecting the ideological location of the policymaker display significant coefficients. Thus, it seems that, at least with respect to spending decisions, the orientation of the policymaker prevails over the one expressed by the voters (when the two are conflicting). Again, this result is not surprising, since in a representative democracy the policy is decided by the government and not directly by the electorate. Notice also that the ideological location of the median voter does not significantly affect the change in government consumption expenditure even after the ideological location of the policymaker is dropped (Column 6). All in all, the evidence proposed suggests that the ideological preferences of the median voter (and by extension of the electorate as a whole) could be imperfectly incorporated into those of the policymaker and when this happens only the latter ones count, at least for fiscal spending decisions.

4.6 Conclusions and directions of future research

Political and institutional determinants of fiscal policy have been investigated in this Chapter. A set of structural models have been discussed in order to obtain theoretical predictions to be tested on the sample of western European coalition systems. Results can be summarised as follows.

The first prediction states that fiscal policy is systematically manipulated by electoralist governments in the electoral and/or pre-electoral year. My analysis does not provide any significant empirical support for this prediction. This result is common to most of the applied literature in this field (i.e. Peltzamn, 1992 and Alesina et al. 1997), although Corsetti and Roubini (1992) do find that budget deficits in industrial countries over the period 1960-1985 are higher in pre-electoral years. I believe that the differences between my findings and theirs is essentially due to differences in the sample size and length. In fact, my sample is more similar to the one used by Alesina et al. (1997, Chapter 9) and they also argue that sample differences explain most of the discrepancies between their results and those reported by Corsetti and Roubini.

The second prediction states that left-wing governments spend and tax more (than right-wing governments), but they do not necessarily sustain larger deficits. I find, in accordance with most other contributions (see, inter alia, Pettersson, 2000), that effectively leftist cabinets are associated to greater increases in spending and taxation. I also obtain that when using tri-partition dummies, left-wing governments are associated to smaller deficits. This result is certainly in contrast with those commonly reported in the literature (i.e. De Haan and Strum, 1994 and Alesina et al. 1997 find no significant relationship; Borrelli and Royed, 1995 find that left-wing governments are associated to higher deficits). I suggest this difference could be due to the fact that (i) I make use of an innovative empirical measure of government ideology and (ii) by using tri-partition dummies I can isolate the impact of centrally located government, for which a clear relationship between ideology and deficit is more ambiguous. However, more work on this issue is certainly needed.

The third prediction is that government instability generates the incentive for the incumbent to use fiscal policy strategically to tight the hands of a potential successor that holds different policy preferences. Existing contributions normally measure instability by average cabinet duration (Grilli et al., 1991 and Franzese, 1998) rate of government turnover (De Haan et al. 1999) or number of government transfers (Volkerink, 1999). That is, measures of *observed* instability are used. Since the theory predicts that it is the simple possibility to be replaced in office that induces the incumbent to use fiscal policy strategically, I prefer estimating by probit and logit the probability for a government to collapse and then use this probability as a measure of instability. In fact, this measure does not appear to correlate significantly with deficit or spending. However, when weighed by the size of alternation in office and portfolios volatility, instability is found to be an important determinant of fiscal policy variables. Thus, it appears that the incentive to use deficit strategically exists to the extent that government instability involves relevant changes in the composition of the coalition and in the allocation of portfolios.

The fourth prediction is that the dispersion of political power increases the degree of fiscal irresponsibility of the incumbent. I obtain that coalition governments are effectively associated to larger deficits and greater spending, whilst minority governments are not. This finding contradicts those in Edin and Ohlsson (1991) and suggests that budget formation is more a problem of intra-government rather than intra-parliamentary bargaining. I believe that again differences in the size and length of the sample (and, in particular, the larger weight of Scandinavian countries in my sample) as

well as differences in the coding of dummy variables (I consider as minority governments all those single-party governments that receive an explicit but external support from other parties) generate differences in the econometric findings. The fact that coalitions are more fiscally irresponsible whilst minority governments are not also suggests that the index of dispersion of Roubini and Sachs (1989a,b) might not be the most appropriate tool to detect the relationship between fragmentation and deficit. This in turn would explain why in some studies the estimated coefficient on that index is statistically significant whilst in others it is not. Finally, differently from Perotti and Kontopoulos (1999) I find that continuous measures of fragmentation are not significant determinants of deficit and spending. In fact, whilst I estimate a regression for the whole sample period, Perotti and Kontopoulos divide the total period 1960-1995 into three "decades". If the relationship between fragmentation and fiscal policy is volatile across different decades, then estimated coefficients on continuous measures would be significant in (some of the) regressions run over individual decades, but possibly not different from zero in a regression run over the whole sample period.

The fifth prediction concerns the role of budgetary institutions. As suggested by the theory of Hallerberg and Von Hagen (1997) I find that cross-country differences in the degree of centralisation of the budget formation process affect both spending and taxation. It is this effect of institutions on tax revenues that is more innovative relative to previous findings and that I believe should deserve greater attention in the future. More generally, the interaction between comparative politics and economic policy is a most promising avenue of future research, as noted by Persson and Tabellini (1998 and 2000).

Finally, the last Section of the Chapter provides some evidence on an issue which has been so far neglected in the literature: the empirical relevance of the ideological preferences of the median voter. It turns out that the ideology of the policymakers does not always coincide with the one of the median voter (as instead the median voter theorem would suggest) and when the two are conflicting only the former matters for fiscal policy decisions.

Throughout the Chapter and this concluding section a series of suggestions for future research have been pointed out. I would like to mention another two. The first one concerns the role that international economic integration will have on the interaction between politics and economics in fiscal policy formation. With respect to the specific case of European countries, the question is how participation into the monetary union alters the political incentives faced by national governments. The

Growth and Stability pact establishes some fiscal criteria that limit the size of the deficit and the amount of public debt a member-state can generate. However, this does not necessarily means that national governments do not retain any degree of freedom in setting fiscal policy. A balanced budget can be obtained by a combination of various interventions on different components of the budget and the choice of which combination to adopt to hit the fiscal target might still be influenced by political considerations.

The second one concerns the role of cross-country differences of political and institutional arrangements within the European Union. In particular, the question of interest is whether these differences could represent an obstacle to the economic (and political) success of the Union. If this were the case, then the next question to be addressed would be whether the homogenisation of these arrangements (which is clearly costly) should be promoted and/or whether it would be worth undertaking a process of delegation of fiscal policy to centralised institutions (to be designed).

Appendix A4.1. A two-period model of fiscal policy with partisan preferences.

This Appendix contains the mathematical details of the model with partisan preferences introduced in Subsection 4.1.2.b of this Chapter. The basic set up is a simplified version of the two period model proposed by Beetsma and Bovemberg (1997).

The economy is described by an expectations augmented Phillips curve that incorporates the distortionary effect of taxation on output:

$$(A4.1) \quad y_t = \pi_t - \pi_t^e - \tau_t + \varepsilon_t$$

where y denotes output, π and π^e are actual and expected inflation respectively, τ is distortionary taxation and ε is a shock with zero mean and finite variance.

Over the two periods, party j ($j = r,l$) stays in office. Its objectives are summarised by the following loss function:

$$(A4.2) \quad W = \sum_{t=1}^{2} \beta^{t-1} L_t^j \quad \text{with } L_t^j = \frac{1}{2}\left[y_t^2 + k_1^j (g_t - \mathbf{g}^j)^2 + k_2^j \pi^2\right]$$

where β is the discount factor of party j, g denotes public spending, $\mathbf{g}^j$ is the spending target for party j and k_1^j and k_2^j are positive weights.

Party j finances public spending by means of taxation and public debt. A stock D_0 of outstanding debt is inherited at the beginning of the first period. Debt must be always paid back, so that new debt can be issued in the first period, but not in the second one. The real rate of interest ρ on public debt is assumed to be constant over the two periods. The budget constraint in the two periods can be therefore written as:

$$(A4.3.a) \quad g_1 = -(1+\rho)D_0 + \tau_1 + D_1 \pm \mathbf{g}^j \quad \text{and} \quad (A4.3.b) \quad g_2 = -(1+\rho)D_1 + \tau_2 \pm \mathbf{g}^j$$

To focus on fiscal issues I assume that monetary policy is delegated to an independent central banker who perfectly controls inflation and who is always able to deliver the optimal rate of inflation $\pi = 0$. To solve the model, I follow Jensen (1994) and neglect supply side shock. The period t first order conditions for taxation and public spending can therefore be written as:

(A4.4.a) $\tau_t = -k_1^j(g_t - \mathbf{g}^j)$

(A4.4.b) $k_1(g_t - \mathbf{g}^j) - \beta(1+\rho)\left[k_1^j\left(g_{t+1} - \mathbf{g}^j\right)\right] = 0$

Substituting (A4.4.a) into the second period budget constraint and rearranging terms, the expenditure gap in period 2 can be expressed as a function of the stock of debt in period 1 and the target level of spending:

(A4.5) $g_2 - \mathbf{g}^j = \dfrac{-(1+\rho)D_1 - \mathbf{g}^j}{1+k_1^j}$

Using the first period budget constraint and (A4.4.a) again to define taxation, an expression for the first period stock of debt is obtained:

(A4.6) $D_1 = (g_1 - \mathbf{g}^j)(1+k_1^j) + \mathbf{g}^j + (1+\rho)D_0$

Equation (A4.6) is then substituted into equation (A4.5) to obtain an expression for the expenditure gap in the second period as a function of the expenditure gap in the first period:

(A4.7) $g_2 - \mathbf{g}^j = -\dfrac{1+\rho}{1+k_1^j}\left[(g_1 - \mathbf{g}^j)(1+k_1^j) + \mathbf{g}^j + (1+\rho)D_0\right] - \dfrac{\mathbf{g}^j}{1+k_1^j}$

Equating (A4.4.b) and (A4.7) yields equilibrium public spending in the first period as a function of the spending target, the initial stock of debt and the relative weight assigned to the spending objective in the loss function of party j:

(A4.8) $g_1 = \mathbf{g}^j\left[1 - \dfrac{\beta(1+\rho)}{1+\beta(1+\rho)^2}\dfrac{(2+\rho)}{1+k_1^j}\right] - D_0\dfrac{\beta(1+\rho)}{1+\beta(1+\rho)^2}\dfrac{(1+\rho)^2}{1+k_1^j}$

which can then be substituted into (A4.7) to obtain equilibrium spending in the second period.

Empirically testable predictions are based on some simple comparative statics results concerning (A4.7) and (A4.8). The partial derivatives of g_1 with respect to k_1^j and $\mathbf{g}^j$ are:

$$\text{(A4.9.a)} \quad \frac{\partial g_1}{\partial k_1^j} = -\mathbf{g}^j \left[\frac{\beta(1+\rho)}{1+\beta(1+\rho)^2} \left(-\frac{2+\rho}{(1+k_1^j)^2} \right) \right] - D_0 \left[\frac{\beta(1+\rho)}{1+\beta(1+\rho)^2} \left(-\frac{(1+\rho)^2}{(1+k_1^j)^2} \right) \right]$$

$$\text{(A4.10)} \quad \frac{\partial g_1}{\partial \mathbf{g}^j} = 1 - \frac{\beta(1+\rho)}{1+\beta(1+\rho)^2} \left(\frac{2+\rho}{1+k_1^j} \right)$$

Notice immediately that the derivative w.r.t. k_1^j is positive for all the values of the parameters: spending in the first period increases with the weight assigned to the spending target. Since left-wing parties are usually regarded as relatively more concerned than right-wing parties about spending, the result in (A4.9.a) suggests that public spending should be higher when the policymaker is left-oriented.

The sign of the derivative w.r.t. $\mathbf{g}^j$ is instead ambiguous and depends on the relative size of k_1^j, β and ρ. However, rearranging terms in equation (A4.10), one obtains that spending in the first period is increasing in the target level of public spending iff:

$$\text{(A4.11)} \quad (1+\rho)[\beta - \beta(1+\rho)^2 k_1^j] < (1+k_1^j)$$

A sufficient condition for (A4.11) to be true is that $k_1^j > 1/(1+\rho)^2$, which holds for a wide range of parameter values. Thus, under a rather general set of conditions concerning the size of k_1^j and ρ, the model yields the prediction that public spending in the first period is higher, the higher the target level of public spending for the party in office. Again, since left-wing parties are usually maintained to prefer higher spending relative to right-oriented ones, $\mathbf{g}^l > \mathbf{g}^r$ and hence greater spending should effectively be observed when left-wing governments are in office.

With respect to spending in the second period, partial derivatives are as follows:

$$\text{(A4.12.a)} \frac{\partial g_2}{\partial k_1^j} = \frac{\mathbf{g}^j}{(1+k_1^j)^2} + \frac{1+\rho}{(1+k_1^j)^2} \left[\mathbf{g}^j + (1+\rho)D_0 - (1-\delta)(1+k_1^j)^2 \right]$$

$$\delta = \frac{\beta(1+\rho)}{1+\beta(1+\rho)^2} \frac{(2+\rho)}{(1+k_1^j)}$$

$$(A4.12.b)\ \frac{\partial g_2}{\partial \mathbf{g}^j} = \left(\frac{k_1^j}{1+k_1^j}\right) - \left(\frac{1+\rho}{1+k_1^j}\right)\left[1 - \frac{\beta(1+\rho)(2+\rho)}{1+\beta(1+\rho)^2}\right]$$

The sign of the derivative (A4.12.a) is ambiguous and depends, among other things, on the stock of debt inherited D_0. A more clear-cut result is obtained with respect to the sign of the derivative (A4.12.b). For $\beta(1+\rho) > 1$ this derivative is positive. As discussed in Tirelli (2000), $\beta(1+\rho) > 1$ is the condition for the stability of the system. Thus, it can be concluded that if the system is stable, then actual spending in the second period is increasing in the target level of spending.

Thus the model suggests that partisan preferences incorporated into the loss function of the party in office as different spending targets or different weights associated to hitting such targets do affect public spending in both periods. More specifically, the rather clear-cut prediction is that spending is higher when the policymaker is left-oriented. It is worth stressing that it would be incorrect to stretch this prediction to say that left-wing parties should be associated to larger deficits. This result would not strictly come from the model. In intuitive terms, it if is true that left-wing parties are willing to spend more than right-wing governments, it is also likely to be true that they tend to tax more, so that overall deficit is not unambiguously larger.

Finally, the basic predictions concerning the partisan cycle of public spending are qualitatively unchanged even in a more sophisticated infinite time-horizon framework where monetary policy is not delegated. This extension is investigated by Tirelli (2000), who also adds a quadratic term in the deviations of actual debt from a given positive level to the loss function of the incumbent in office.

Appendix A4.2. Tables with econometric results

Note on sample size: Sample period is 1965-1995 (403 annual observations) for regressions where DEF and DG are the dependent variables and 1970-1995 (338 annual observations) for regressions where DT is the dependent variable. However, when DG is the dependent variable the panel is unbalanced (370 observations) due to the fact that data on government consumption expenditure for Austria, Denmark, Iceland Netherlands, Norway and Sweden start in 1970. The panel is also unbalanced (334 observations) for models where DT is the dependent variable. This is due to the fact that for Denmark and Luxembourg data on DT start in 1971, whilst for Iceland data on DT start in 1972. Further unbalances due to the restricted availability of political data are highlighted in the notes at the bottom of the Table A4.1 and Table A4.5.

Table A4.1 *The impact of the electoral cycle and the ideological orientation of the policymakers on fiscal policy variables.*

	1 DEF	2 DEF	3 DEF	4 DEF	5 DG	6 DT	7 DEF
DEF_{-1}	.575904 (.01501)	.574924 (.05017)	.593553 (.05076)	.577268 (.05246)			.577116 (.05261)
DU	1.52256 (.19413)	1.51938 (.19428)	1.47000 (.19474)	1.43200 (.19814)	.190635 (.02428)	-.00214 (.27808)	1.41801 (.19945)
DY	-.33584 (.07592)	-.33798 (.07601)	-.35748 (.07593)	-.34990 (.07684)	-.09772 (.00807)	.053946 (.09499)	-.35493 (.07724)
Dr	.050460 (.01261)	.049912 (.01263)	.052229 (.01253)	.051303 (.01265)			.051246 (.01268)
ELE		.003385 (.00403)					
LOC			.000784 (.00124)				
ID					-.001051 (.00054)	-.017962 (.006578)	
DL				-.009514 (.005280)			-.00720 (.00590)
DC				-.001799 (.004789)			-.00221 (.00485)
COAL							.005335 (.00615)
favoured estimator	OLS	OLS	OLS	OLS	FE	FE	OLS

Note: standard error in brackets. Estimates of the constant term (OLS and RE) are not reported The measures of ideological location in the Table are those defined as ID4, DL4 and DC4.
The panel used for the estimation of model 3 is unbalanced (401 observations) due to the fact that ideological policy scales for Italy are not available after 1993 (when anti-corruption investigations produced major changes in the composition of the party space). However, being the general ideological orientation of the new parties formed since 1994 easily identifiable, ideological dummies could still be coded for the year 1994 and 1995.

Table A4.2 *Probit and Logit estimates of the probability of termination.*

	1 TERM	2 TERM	3 TERM	4 TERM
Constant	.540417	.878644	.552551	.706075
$TERM_{-1}$	-.282381	-.444807	-.16260	-.060021
MAJ	-.465663	-.768122	-.507800	-.189512
SING	-.599685	-.979283	-.840032	-.312042
CI	-.068678	-.110429		
POL	1.08258	1.79327		
DL	-.240313	-.383687		
GR	-.010712	-.017187		
GR_{-1}	-.005428	-.008515		
model	PROBIT	LOGIT	PROBIT	LOGIT

Note: the measures of ideological location in the Table is that one defined as DL4.

Table A4.3 *The impact of instability on fiscal policy variables.*

	1 DEF	2 DEF	3 DEF	4 DG
DEF_{-1}	.574463 (.05019)	.560630 (.05016)	.548328 (.05158)	
DU	1.51488 (.19447)	1.50471 (.19271)	1.53621 (.19709)	.168422 (.02448)
DY	-.33807 (.07601)	-.342839 (.07536)	-.32173 (.07654)	-.09873 (.00822)
Dr	.051144 (.01264)	.050373 (.01251)	.052794 (.01297)	
INSTAB	.003981 (.00481)			
INSTAB*ALT		.028881 (.01247)		
INSTAB*PPV			.000826 (.00039)	
TERM*ALT				.002037 (.00115)
favoured estimator	OLS	OLS	OLS	RE

Note: standard error in brackets. Estimates of the constant term (OLS and RE) are not reported. The measure of instability (INSTAB) reported in the table is the one obtained from Column 1 of Table A4.2.

Table A4.4 *The impact of fragmentation on fiscal policy variables.*

	1 DEF	2 DEF	3 DEF	4 DEF	5 DEF
DEF_{-1}	.575721 (.50015)	.531739 (.05196)	.567737 (.04987)	.571221 (.04988)	.527991 (.05171)
DU	1.48341 (.19420)	1.60917 (.19610)	1.47639 (.19244)	1.45264 (.19294)	1.58992 (.19411)
DY	-.33952 (.07539)	-.29627 (.07639)	-.331738 (.07512)	-.34191 (.07548)	-.29378 (.07554)
Dr	.050600 (.01253)	.050546 (.01292)	.050605 (.01243)	.050178 (.01243)	.050683 (.01278)
COAL	.009181 (.00492)				
MIN		-.01978 (.00739)	-.01709 (.00581)	-.01577 (.00642)	-.03599 (.01102)
COAL*MIN			.015988 (.00693)	.016099 (.00692)	
MAJ*CI				.001129 (.00282)	
MIN*POL					.090324 (.03935)
favoured estimator	OLS	FE	OLS	OLS	FE

Note: standard error in brackets. Estimates of the constant term (OLS and RE) are not reported. The measures of ideological location in the Table are those defined as ID4, DL4 and DC4.

Table A4.5 *The impact of budgetary procedures, electoral rules and median voter ideology on fiscal policy variables.*

	1 DEF	2 DEF	3 DG	4 DEF	5 DG	6 DG
DEF_{-1}	.618123 (.05349)	.574031 (.05044)		.571893 (.05274)		
DU	1.46590 (.18969)	1.52706 (.19478)	.180424 (.02429)	1.39286 (.20130)	.201832 (.02475)	.197991 (.02435)
DY	-.33246 (.07921)	-.33539 (.07605)	-.10074 (.00820)	-.34201 (.77228)	-.09894 (.08078)	-.09911 (.00795)
Dr	.054783 (.01391)	.050199 (.01265)		.052715 (.01272)		
Delegation	.004107 (.00439)					
Contract	.002221 (.00269)					
Unconstrained	.006385 (.00336)					
PR		-.00143 (.00365)	.001535 (.00046)			
DR					-.001349 (.000741)	
DL				-.00759 (.00561)		
DC				.000069 (.00506)	-.001165 (.000582)	
IDMVL				-.011460 (.10266)		
IDMVR					-.001824 (.00130)	-.00092 (.00145)
IDMVC				-.00849 (.00767)	.000923 (.00081)	.001295 (.00103)
favoured estimator	OLS	OLS	OLS	OLS	OLS	OLS

Note: standard error in brackets. Estimates of the constant term (OLS and RE) are not reported. The measures of ideological location in the Table are those defined as ID4, DL4 and DC4. Due to the lack of information about their budgetary procedures, Norway and Iceland are dropped from the sample used to estimate the model in Column 1. Thus, the number of observations used for the model in Column 1 is 341.

Appendix A4.3. Variables description.

ELE *Electoral dummy*. Dummy variable taking value 1 in the electoral year (if elections are held in the third or fourth quarter of the electoral year) or in the pre-electoral year (if elections are held in the first or second quarter of the electoral year).

ELX *Electoral dummy*. Dummy variable taking value 1 in the electoral year, independently on when, during the electoral year, elections are held.

LOC *Ideological location of the government*. Ideological location of the government on the ten points Left-Right policy scale. Four different versions are computed, one for each possible structure of the decision-making process. Let n be the total number of coalition partners and θ_i the ideological location of generic coalition partner i. The general formula is:

$$LOC = \sum_{i=1}^{n} \omega_i \theta_i \quad \text{where } \omega_i \text{ is a non-negative weight and } \sum_{i=1}^{n} \omega_i = 1.$$

Then the following four system of weights are used:

- LOC1 (based on a *cabinet government* structure): ω_i is equal to the share of portfolios held by generic coalition partner i.
- LOC2 (based on a *party government* structure): ω_i is equal to the share of coalition seats held by generic coalition partner i.
- LOC3 (based on a *prime-ministerial government* structure): ω_i is equal to 1 if party i controls the office of prime minister and zero otherwise.
- LOC4 (based on a *ministerial government* structure): ω_i is equal to the share of key portfolios held by generic coalition partner i.

If two or more governments are in office in a given year t, then LOC is computed as the weighted average of the ideological locations of these governments, with weights equal to the proportion of time each government stayed in office during that year t.

Ideological dummies Let LOCx be a generic cardinal measure of ideological location of government obtained from the general formula above (x = 1, 2, 3, 4). Then the following dummies are defined:

- IDx takes value 1 in year t if LOCx in that year is larger than the threshold value 5.5.
- DLx takes value 1 in year t if LOCx in that year is smaller than the threshold value 4.6.
- DCx takes value 1 in year t if LOCx in that year is included between the two threshold values 4.6 and 6.4.
- DRx takes value 1 in year t if LOCx in that year is larger than the threshold value 6.4.

COAL *Coalition status*. Dummy variable taking value 1 if government is formed by a coalition of two or more parties (parties giving only external support

are not counted as members of the ruling coalition).

SING *Single-party status.* Dummy variable taking value 1 if government is formed by only one party (parties giving only external support are not counted as members of he ruling coalition).

MIN *Minority status.* Dummy variable taking value 1 if government does not control the absolute majority of seats in the parliament (parties giving only external support are not counted as members of the ruling coalition).

MAJ *Majority status.* Dummy variable taking value 1 if government controls the absolute majority of seats in the parliament (parties giving only external support are not counted as members of the ruling coalition).

CI *Conflict of interest.* Dispersion of the policy positions of coalition partners. CI measures the degree of ideological heterogeneity within the coalition. For computational details see Appendix A2.4.

ENP *Effective number of parties in the ruling coalition.* ENP is an indicator of the degree of numerical (as opposed to ideological) fragmentation of the coalition. For computation details see Appendix A2.4.

ANP *Absolute number of parties in the ruling coalition.* ANP is an alternative indicator of the degree of numerical (as opposed to ideological) fragmentation of the coalition. For computational details see Appendix A2.4.

FRA *Effective number of parties in the legislature.* FRA is an indicator of the numerical fragmentation of the legislature. For computation details see Appendix A2.4.

POL *Polarisation of the party system.* POL is an indicator of the dispersion of policy views in the party system (legislature) as a whole. For computation detail see Appendix A2.4.

TERM *Observed cabinet termination.* Dummy variable taking value 1 if in year t a cabinet termination is observed.

INSTAB *Cabinet instability.* Estimated probability that a government collapse will be observed in the near future. INSTAB is obtained from probit and logit analysis (see subsection 4.4.5, equation (4.26)).

ALT *Alternation in office.* ALT provides a quantitative measure of the changes in the composition of the ruling coalition generated by a government transfer. For computational details see Appendix A2.4.

TPV *Total portfolios volatility.* TPV is a measure of the changes in the structure of portfolios allocation generated by a government transfer. For computation details see Appendix A2.4.

PPV *Party portfolios volatility.* PPV is a measure of the changes in the structure of portfolios allocation generated by a government transfer. For

computation details see Appendix A2.4.

IPV *Ideological portfolios volatility.* IPV is a measure of the ideological changes in the structure of portfolios allocation generated by a government transfer. For computation details see Appendix A2.4.

Delegation *Centralisation/Delegation to MoF of budget formation.* Dummy variable taking value 1 for those countries where the process of budget formation is centralised in the hands of a strong Minister of Finance (MoF). Coding of this dummy is based on Hallerberg and Von Hagen (1997).

Contract *Commitment to fiscal targets.* Dummy variable taking value 1 for those countries where commitments to negotiated fiscal targets defined in contracts agreed upon by coalition partners are normally taken. Coding of this dummy is based on Hallerberg and Von Hagen (1997).

Unconstr. *Unconstrained budget formation.* Dummy variable taking value 1 for those countries where the process of budget formation is not delegated to the MoF and commitments to fiscal targets are not normally taken. Coding of this dummy is based on Hallerberg and Von Hagen (1997).

PR *Proportional Rule.* Dummy variable taking value 1 if the electoral system of a given country is based on a purely proportional rule.

IDMV *Ideological location of the median voter.* The location of the median voter is assumed to be represented by the location of the party whose share of votes added to the share of votes of parties on its ideological left (or right) makes the cumulative sum of shares larger than the majority threshold 0.5. For instance, consider a four-party system. A is located at 2.15, B at 4.14, C at 6.13 and D at 8.00. Share of votes are as follows: s_A= 0.15, s_B = 0.4, s_C = 0.35, s_D = 0.2. Then, the median voter location coincides with the one of party C (6.13). This procedure effectively approximates the location of the median voter, so that only dummy variables are used in the analysis of Chapter 4:

- IDMV takes value 1 if the procedure yields a location to the right of 5.5.
- IDMVL takes value 1 if the procedure yields a location to the left of 4.6.
- IDMVC takes value 1 if the procedure yields a location between 4.6 and 6.4.
- IDMVR takes value 1 if the procedure yields a location to the right of 6.4.

DEF *Annual deficit.* Annual change in the debt-to-GDP ratio. Data on Government Debt are from OECD-MEI (series coded ..GGFL). for Luxembourg data are from IMF-IFS (series coded 13788A..ZF).

DEF_{-1} Lagged value of DEF.

DY *Change in the rate of output growth.* It is computed as the difference between the rate of growth of GDP in year t and the previous n periods

average rate of growth of GDP. Various values of n have been tried. Results reported in Appendix A4.2 refer to the case of $n = 5$. Data on GDP are from OECD-MEI (series coded ..011 and ..76).

DU *Change in the rate of unemployment.* It is computed as the difference between the rate of growth of GDP in year t and the previous n periods average rate of growth of GDP. Various values of n have been tried. Results reported in Appendix A4.2 refer to the case of $n= 5$. Data on unemployment are from OECD-MEI and Statistical Compendium (series coded ..428).

Dr *Burden of debt.* Change in the difference between the real interest rate and the rate of GDP growth times the lagged debt-to-GDP ratio. Data on the rate of interest are from OECD-MEI (series coded ..IRL).

DG *First difference in government consumption expenditure to GDP ratio.* Government consumption expenditure includes subsidies and transfers. Data on government consumption expenditure are from OECD-Statistical Compendium (series coded ..65)

DT *First difference in tax revenues to GDP ratio.* Tax revenues include revenues from indirect taxation. Series on tax revenues are from IMF-International Government Statistics (item IV of Table A "Revenue and Grants of Consolidated Central Government").

Where necessary, real values of economic indicators have been computed from nominal series using the GDP deflator (series coded ..PGDP) provided by the OECD-MEI.

CONCLUSIONS

> "*Nice things always come to an end* " (old Italian proverb).

Three issues in political economy have been investigated in this thesis: government formation, government duration and political determination of fiscal policy decisions. The general strategy of analysis adopted has been to discuss theoretical models first and then undertake systematic econometric testing of the predictions generated by such models. The implementation of these econometric tests has required the preliminary construction of a political data-set that includes some innovative variables aimed at providing empirical representation to factors not previously considered in the literature (or empirically represented in a less sophisticated and satisfactory way). I believe that at least some of the value added of this research has its source in this data-set, which is described in Chapter 1.

The econometric analysis is based on a sample of thirteen western European coalition systems (Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway and Sweden) over the period 1950-1995. An overview of the main features of the political framework in these countries is given in the second part of Chapter 1. The most intriguing piece of preliminary evidence concerns the common pattern that most countries exhibit with respect to polarisation of ideologies in the party system and the support expressed by voters for extremist parties. The first legislatures after the end of World War II are characterised by a rather strong consensus for Communist and other extreme-left parties. In more recent times, the decrease in the popularity of left-wing extremism has been compensated by the rise of support for extreme-right and nationalist parties. Considerable importance have also gained, at least in some countries, language and regional parties.

The core of the original contribution of the thesis is contained in Chapters 2, 3 and 4. Key findings and prospects for future research are summarised here below.

Cabinet formation in coalition systems

Chapter 2 has investigated cabinet formation as a problem of bargaining over the allocation of decision making power among a set of coalition partners. Three different

theoretical forms of bargaining have been considered. In the first one, the object of negotiations is identified with a small set of key portfolios (eventually just one key portfolio), the control of which is a necessary and sufficient condition for parties to be able to affect significantly the contents of economic policy. The interaction is modelled as a war of attrition, so that the cabinet is formed only when all but K parties have dropped out of negotiations (K is the number of key portfolios available; in Chapter 2, K is set equal to 1; as it is discussed in Subsection 2.2.1, this assumption is not unrealistic). Unlike existing applications of the war of attrition, players are uncertain about their own nature, at least until the game has not reached the last stage where only two survivors are left to compete for the final prize (the key portfolio). The Nash equilibrium is then derived by taking rational expectations over the flow of payments that a party receives in case of victory and defeat. A clear-cut theoretical prediction of the model is that negotiations will last longer the more ideologically heterogeneous parties in the coalition are. This is because when the coalition is more dispersed and the generic party *i* does not obtain control of the key portfolio, there is a higher probability that the portfolio is won by a partner with policy preferences significantly different from those that characterise *i*. In this sense, party *i* faces a higher risk of being partner in a government that undertakes policies which are quite a distance away from those preferred by party *i* itself. Faced with this higher risk, party *i* has an incentive to fight longer to obtain control of the key portfolio. The same incentive exists for all parties involved in negotiations and henceforth the formation of the government is delayed.

A statistical model of duration is estimated to identify the determinants of the length of the bargaining process. It turns out that the degree of ideological heterogeneity, measured by the dispersion of the locations of coalition partners on a ten point Left-Right policy scale, positively correlates with formation duration. This result is clearly supportive of the theory of war of attrition. Another finding consistent with the theory is that bargaining is longer when the expected duration of the forming cabinet, measured by the time horizon to next scheduled elections, is longer. Other variables are found to play a significant role. Among these are some economic indicators. It seems that negative economic conditions (such as low growth of industrial production) tend to favour faster formation. However, a more structural theory that links the state of the economy to the bargaining behaviour of parties is certainly needed.

The second form of bargaining considered is a version of the traditional problem of allocation of a cake. The set of cabinet posts is taken to be a cake with a set number of pieces. The goal of each party involved in negotiations is to gain the largest possible

share. A cabinet is formed only when a proposal of partition of the cake is made by one party and accepted by all the other partners. The key prediction of this model is that the share of posts that the *formateur* party will be able to secure in equilibrium is smaller the longer the negotiation. The intuition for this result is that the formateur party more than the other coalition parties has an interest in making the formation attempt successful. A long negotiation is a signal of a more difficult bargaining environment. In turn, the more difficult the bargaining environment is, the higher the probability that the formation attempt will fail. Faced with this higher probability of failure, the formateur is willing to concede some portfolios to the other partners in order to facilitate the agreement.

A test of this prediction requires the estimation of a logistic regression of the share of portfolios of the formateur party. The length of negotiations does not appear to be a significant determinant of the share. Nevertheless, other potential indicators of the degree of complexity of the bargaining environment (such as the fragmentation of the coalition) do play a significant role. An important determinant of the share of the formateur is the parliamentary size of the formateur. However, when the dependent variable of the regression is measured by the share of key (rather than all) portfolios, parliamentary size becomes not significant. That is, in the fight over the control of key portfolios, size does not matter. This finding is consistent with the theoretical set-up of the model of war of attrition.

The third form of bargaining is one where parties negotiate directly over policy proposals. The government is formed when parties agree on a common policy proposals; that is, when they reach a common point on a hypothetical Left-Right continuum. Given heterogeneous policy preferences of the various coalition members, each party must make ideological concessions for the common policy proposal to be identified. The rates at which different parties make these ideological concessions determine how far from each preferred policy the final compromise is. These relative distances define a degree of balance of the outcome of the negotiation process. The theoretical prediction is that a U shaped relationship exists between duration of the negotiation and degree of balance.

The empirical implementation of the test of this proposition requires the preliminary definition of a proxy for the degree of balance. I actually define measures of unbalance as deviations of observed outcomes from given benchmarks that might be taken to represent perfectly balanced outcomes. Then Box-Cox regression analysis is applied to estimate the determinants of the degree of balance. Although there is

evidence of a non-linear relationship between duration and degree of balance, econometric results are not particularly robust. This could be explained by the fact that the prediction of a U shaped relationship is extremely clear-cut when coalitions consist of two or even three parties (as in fact the majority of coalitions do), but becomes more ambiguous as the number of parties grows (and in the sample about 1/3 of coalitions do include four or more parties). A statistically more robust effect on the degree of balance can be traced back to the degree of complexity of the bargaining environment (as measured by the fragmentation of the ruling coalition).

Although the objective of the Chapter is to obtain a deeper knowledge of key features of the cabinet formation process and not to establish which theoretical model is best, it appears that the model where parties bargain over key portfolios (the one based on the war of attrition approach) offers some interesting insights and yields predictions which are supported by the empirical evidence. The basic message it delivers is that the degree of ideological heterogeneity of coalition partners matters because it determines the risk faced by each party to end up in a government that undertakes policies significantly different from party's ideal ones. I believe that it would be worthwhile in future research to extend the model to provide a more structural treatment of the relationship between economic conditions and bargaining process. This would allow a more precise interpretation of the econometric results regarding the role of economic variables as determinants of the duration and the outcome of negotiations. I also think that the attempt to measure empirically the degree of balance of the bargaining process and to estimate its determinants should be further developed in the future. In particular, this is a type of analysis that could be undertaken for bargaining situations other than those concerning cabinet formation. In general, the stability of an agreement can be a function of how fair this agreement is (or players think it is). Therefore knowledge of how to measure this degree of fairness and what determines it could be important to reduce uncertainty over the duration of the agreement itself. I can figure out applications to the case of international peace agreements or, less ambitiously, of commercial contracts between firms.

The determinants of government duration

In Chapter 3 I have considered the question of what determines the stability of government. It can be taken as a stylised fact that most governments in western European coalition systems terminate before the completion of the parliamentary term.

However, whilst in some countries the average duration in office is significantly more than ½ of the maximum time between two consecutive mandatory elections, in other countries cabinets last on average one year (or even less). Thus, there are significant cross-country differences in the survival rate of the incumbent. The theory developed by Lupia and McCubbins (1998) on the stability of agreements is used to identify a set of possible political, institutional and economic determinants of government duration. The econometric analysis is based on the representation of the life of a cabinet as a stochastic process whose termination is determined by both structural factors and critical events. A Proportional Hazards Model is then constructed and estimated by a flexible parametric approach.

As predicted by the theory, duration is longer for majority governments and increases in the degree of ideological and numerical homogeneity of the coalition. The overall stability of the legislature, the ideological gap between the coalition and the median legislator, the polarisation of the system and the time horizon to next scheduled elections also play a significant role. Furthermore, graphical evidence suggests that the underlying distribution of duration data is most likely to be a Gompertz (or eventually a Weibull) distribution and that the stochastic process used to represent the history of a cabinet is certainly characterised by positive duration dependence. This means that the probability for a government to terminate increases with the tenure in office.

Two intriguing results which are worth stressing concern the role of economic conditions and the ideological orientation of the government. More specifically, there is evidence that faster growth of industrial production increases the chances of the incumbent to survive. The level and the volatility (as well as the change) of the inflation rate do not instead significantly affect duration. Combined with the findings of Chapter 2, where the duration of the formation process was found to depend on production growth but not on inflation, these results seem to suggest that the state of the real economy is what influences the political process the most.

The ideological orientation of the incumbent is important in the sense that right-wing coalitions appear to generate less stable cabinets. Why this should be the case is a question that certainly deserves further investigation. I propose two possible, not mutually exclusive channels. The first one is that left-oriented governments are more likely to face a less fierce opposition from unions. Less tense labour relations have two important implications. First, they reduce the extent of labour disputes and hence increase the popularity of the government among voters. Unfortunately, the limited availability of data on labour disputes makes it hard to verify the empirical relevance of

their correlation with duration. However, for one of the few countries for which data are indeed available (Italy), Merlo (1998) does find that the correlation is negative and statistically significant. Second, less tense labour relations determine more favourable terms for the inflation/unemployment trade-off, thus allowing the government to deliver high production at low inflation costs.

The second channel builds on the observation that left-wing governments are traditionally more concerned with production and unemployment than they are with inflation. Since it appears that what really matters for government duration is production growth and not inflation stability, left-wing government are intrinsically advantaged relative to right-wing ones, at least in the short term. In this sense, future research should investigate the extent to which differences in the ideological orientation of governments are effectively translated into differences in the rate of production growth. Most of the literature on the determinants of economic growth does include political variables in growth regressions, but virtually none of these contributions considers the ideological orientation of the incumbent.

A final point that future work should address concerns the possibility that political and economic outcomes are jointly endogenous. Bad economic conditions could be at the same time a consequence and a source of political instability. Within the statistical framework adopted in Chapter 2, joint endogeneity could be tackled by using systems of simultaneous equations as described by Maddala (1983).

Political and institutional determinants of fiscal policy outputs

The last Chapter of the thesis has been dedicated to the political economy of fiscal policy formation. The objective of the Chapter is to shed additional light on some controversial issues concerning the empirical relevance of various political and institutional factors. This has been done by using the newly designed variables of the political data-set described in Chapter 1 to estimate panel regressions of deficit, annual change in government consumption expenditure and annual change in tax revenues. As in the other two Chapters, attention is first devoted to the analysis of theoretical models in order to identify a set of testable predictions. Five cases are considered: electoralist manipulation of fiscal policy and fiscal illusion, ideological preferences of the policymaker, strategic accumulation of debt in the presence of political instability, fragmentation of decision making power, the role of budgetary procedure and electoral institutions.

The econometric analysis shows that fiscal policy is not systematically manipulated in the upcoming of elections: deficits and spending are not higher and taxation is not reduced in electoral and pre-electoral years. The impact of political instability is instead more relevant. A higher estimated probability of being replaced in the near future leads the incumbent to use deficit strategically if past observed alternation in office is high. This means that political instability matters, but only to the extent that it generates important changes in the composition of the ruling coalition and in the allocation of portfolios among parties and ministers. In fact, most existing contributions fail to weight instability by the size of political changes and hence end up rejecting the hypothesis that fiscal policy is used strategically to tight the hands of a potential opponent. As a matter of fact, when I re-estimated the model using unweighted measures of instability I also obtained that their correlation with deficit and spending was not statistically significant.

The ideology of the policymaker is an important determinant of spending and taxation. As one would expect, left-wing governments significantly tax and spend more that right-wing governments do. There is also some weak evidence that the overall deficit is smaller when left-wing governments are in office. However, this result could be driven by the generally less fragmented nature of most left-wing governments in my sample. As a matter of fact, the dispersion of political power is a third relevant source of political bias in fiscal policy formation. Using simple dummy variables to isolate coalition governments I find that the coalition status is effectively associated to less tight fiscal policies. Surprisingly, the same is not true for the minority status: minority governments do not necessarily generate larger deficit. This seems to suggest that fiscal policy formation is essentially a problem of intra-government (rather than intra-parliamentary) negotiations. In this sense, my findings conflict with those reported by Edin and Ohlsson (1991). Furthermore, continuous measures of numerical and ideological fragmentation are not found to be significantly correlated with deficit and spending, so that, in the end, it is the simple coalitional status that appears to matter the most.

In line with some recent literature on comparative politics, cross-country differences in fiscal policy outcomes are also found to be generated by differences in the institutional settings adopted by countries. In particular, in countries where budgetary procedures do not imply the delegation of spending decisions to a strong finance minister or the commitment of coalition partners to negotiated fiscal targets, fiscal policy is effectively less tight. Moreover, countries that adopt a purely proportional rule

tend to spend more, although no systematic difference in the size of the deficit is observed.

A final set of results in Chapter 4 concerns the role of the median voter. A procedure for the definition of an approximate measure of the ideological location of the median voter is proposed. This is based on the share of votes received by parties in the general elections. Once this measure is obtained, I study whether it coincides with the ideological location of the government. It turns out that this is not necessarily the case: in slightly less than 1/3 of the sample observations, the median voter is located to the left of the political spectrum when the government is located to the right or vice-versa. I believe that this should not be too surprising. The ideological location of the government results from a bargaining process over the allocation of portfolios in which even small parties can have a significant role. Thus, there is no guarantee that the ideological preferences of the voters will be perfectly incorporated into those of the cabinet that results from political bargaining. The econometric analysis shows that when conflicting with the government, the ideological location of the median voter is not significant for fiscal policy formation. Again, this is not surprising given the representative nature of the democracies in the sample.

An important issue that I believe future research should take up concerns the role that international economic integration will have on the interaction between politics and economics in fiscal policy formation. With respect to the specific case of European countries, the question is how participation into the monetary union alters the political incentives faced by national governments. The *Growth and Stability Pact* establishes some fiscal criteria that limit the size of the deficit and the amount of public debt a member state can issue. However, this does not necessarily means that national governments do not retain any degree of freedom in setting fiscal policy. A balanced budget can be obtained by a combination of various interventions on different components of the budget and the choice of which combination to adopt to hit the fiscal target might still be influenced by political considerations. A related topic that could be worthwhile exploring concerns the role of cross-country differences in the political and institutional arrangements within the European Union. In particular, the question of interest is whether these differences could represent an obstacle to the economic (and political) success of the Union. If this were the case, then the next question to be addressed is whether the homogenisation of these arrangements (which is clearly costly) should be promoted and/or whether it would be worth undertaking a process of delegation of fiscal policy to centralised institutions (to be designed).

Apologia

I have explored the three issues that represent the focus of this thesis to the best of my ability. I hope that someone will find my results interesting and useful. If anything else, I have enjoyed this challenge and I am now ready to turn page and move on to the next set of issues.

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